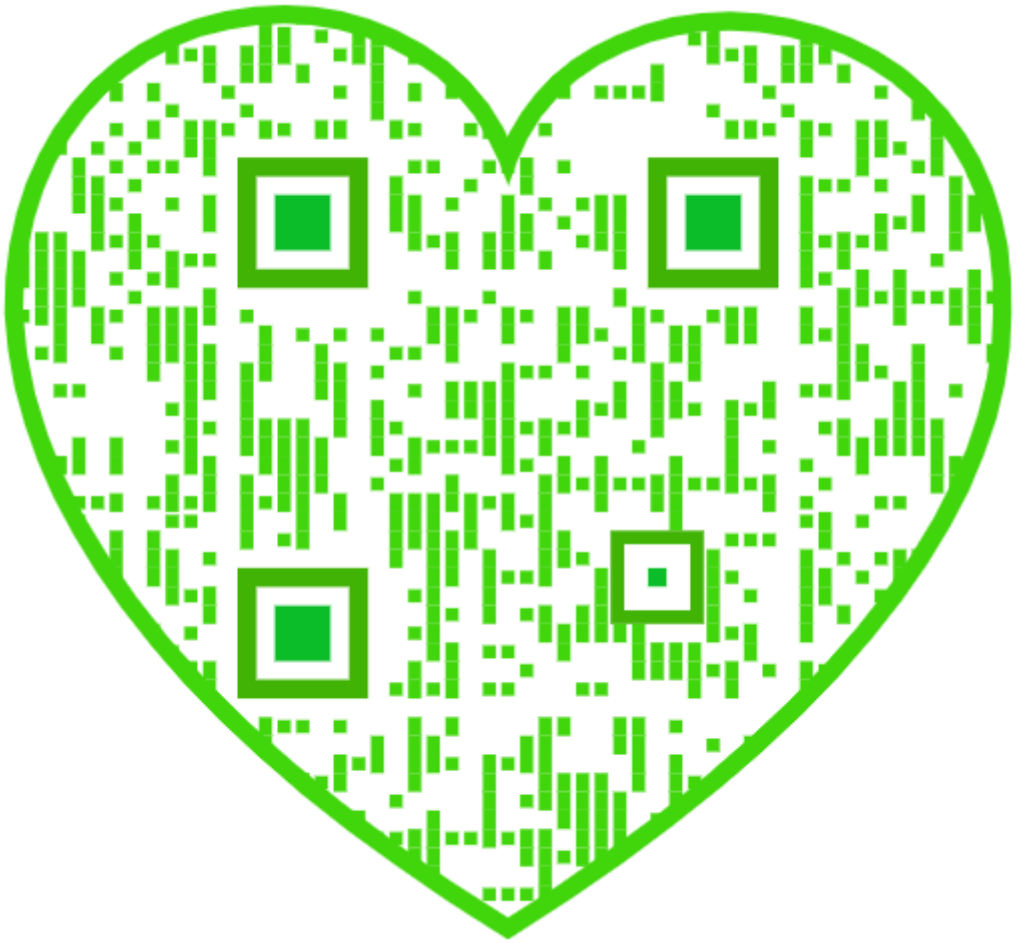
Bouton Foundry Co.

Successors to Union Foundry Works

2600 Archer Ave. Chicago, Ill.



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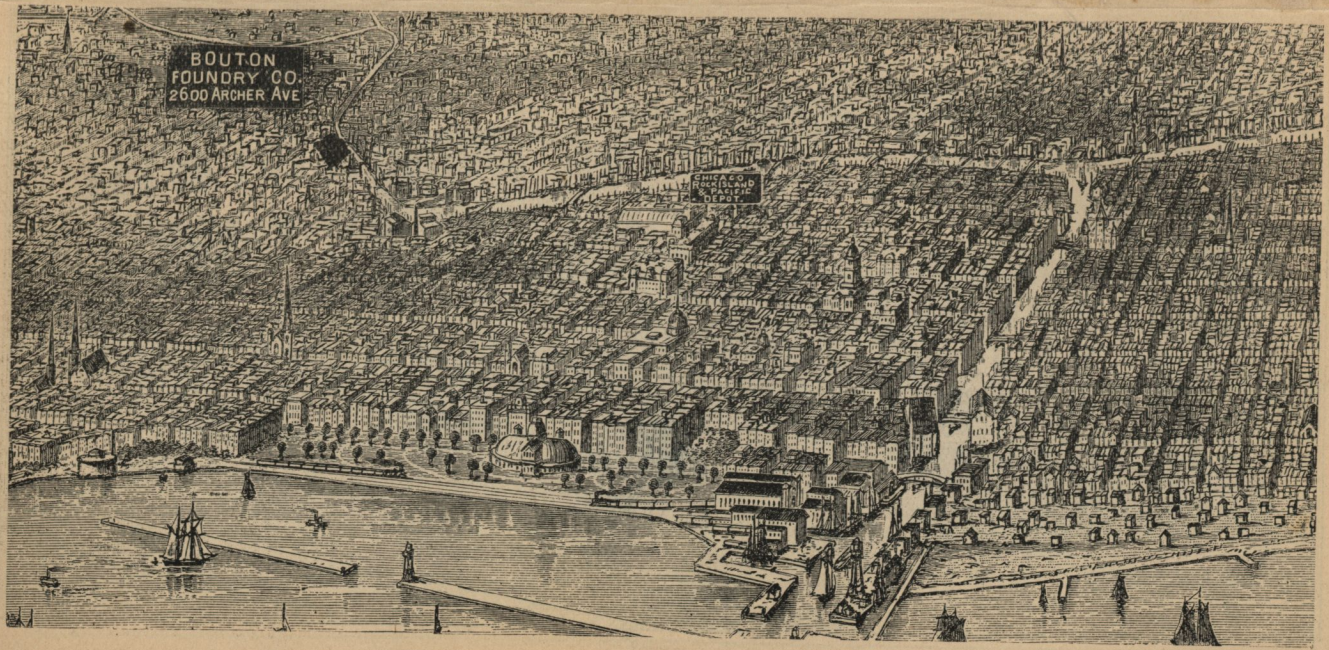
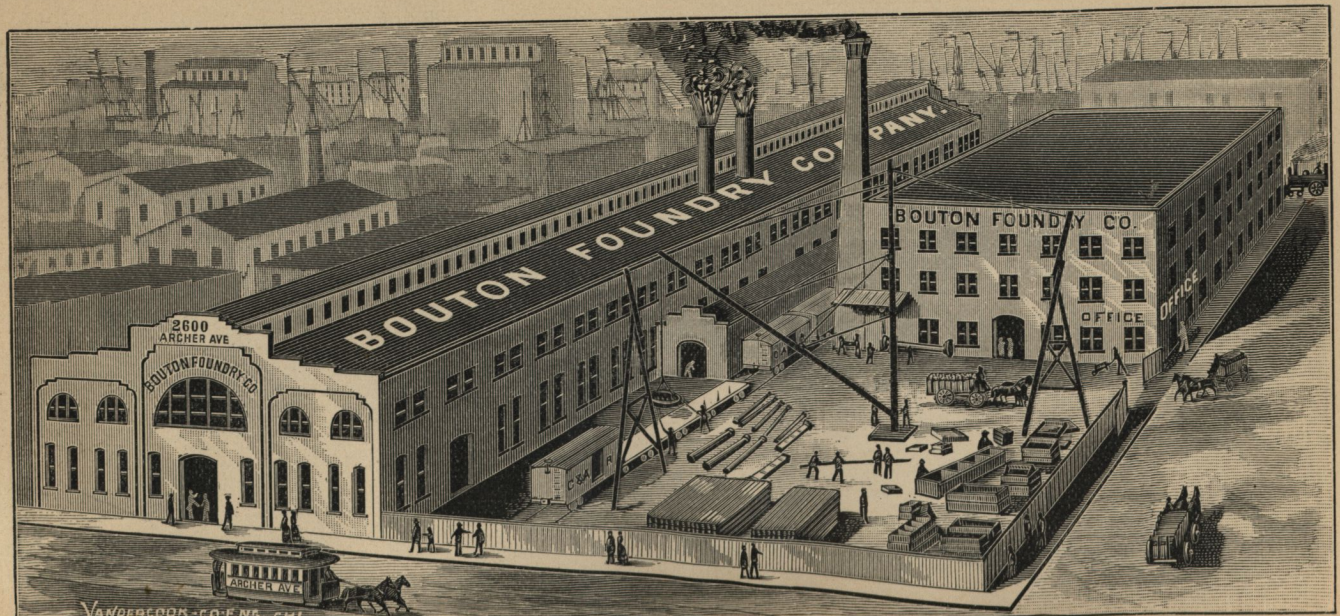

BOUTON
FOUNDRY CO.
2600 ARCHER AVE
CHICAGO
RIDGLAND
& SOUTH
R.R.


BOUTON FOUNDRY COMPANY.
BOUTON FOUNDRY CO.
OFFICE
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2600
ARCHER AVE
BOUTON FOUNDRY CO
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VANDERCOOK-CO-ENG CHI

N. S. BOUTON, PRESIDENT.

E. G. SHUMWAY, VICE-PRES. F. W. BARKER, TREAS.

CARL D. BRADLEY, SEC'Y.

1887.

MANUAL

OF THE

BOUTON FOUNDRY COMPANY

(SUCCESSORS TO UNION FOUNDRY WORKS.)

2600 ARCHER AVENUE,

CHICAGO, ILL.

Containing Useful Information for Architects, Engineers, Builders and Others; also Cuts of a few Patterns of Columns, Sections of Rolled Iron and Steel Beams, Etc., Etc.

ELECTROTYPED AND COPYRIGHTED.

PRICE, $1.00.

R. R. DONNELLEY & SONS, PRINTERS, CHICAGO.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

PREFACE.

In presenting this MANUAL to the trade, a few words as to the past history of our company may not be amiss.

In 1852, our President,

N. S. BOUTON, ESQ.,

organized what for many years was known as the

UNION FOUNDRY WORKS,

located at the corner of 15th and Dearborn Streets, where so much of the iron work used in the Northwest was manufactured.

In 1882 the works were, under the oppressive law of "eminent domain," condemned for railroad purposes, and the company was compelled to seek another location, whereupon it purchased a portion of the stock of a foundry then being organized outside of the city, and allowed the use of its name as a portion of the title of the new company.

But finding that the new move was unsatisfactory the Union Foundry Works sold out its stock and reinvested the proceeds in our present plant, at No. 2600 to 2626 Archer ave., corner of Quarry street Chicago, and re-organized under the title of the

BOUTON FOUNDRY COMPANY,

successors to the Union Foundry Works.

Our plant is equipped with all modern appliances for economically and correctly doing all kinds of architectural cast and wrought iron work, as well as the great variety of general foundry work.

And this new organization of the Union Foundry Works is pledged to maintain and deserve the reputation acquired by the old organization which it succeeds.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

WEIGHT OF CAST IRON PER LINEAL FOOT.

EXAMPLE:—What is weight of a cast iron plate, 2" x 14" x one foot long? ANS:—The thickness multiplied by width equals 28" of sectional area.

In the sixth column, we find that 87½ lbs. is the weight of a piece with a sectional area of 28" and one foot long.

Area Inches.	Lbs.	Area Inches.	Lbs.	Area Inches.	Lbs.	Area Inches.	Lbs.	Area Inches.	Lbs.
1/16	.20	6	18.75	21½	67.19	43	134.38	69	215.63
1/8	.39	6¼	19.53	22	68.75	43½	135.94	70	218.75
3/16	.59	6½	20.31	22½	70.31	44	137.5	71	221.88
¼	.78	6¾	21.09	23	71.88	44½	139.06	72	225.0
5/16	.98	7	21.88	23½	73.44	45	140.63	73	228.13
⅜	1.17	7¼	22.66	24	75.00	45½	142.19	74	231.25
7/16	1.37	7½	23.44	24½	76.56	46	143.75	75	234.38
½	1.56	7¾	24.22	25	78.13	46½	145.31	76	237.5
9/16	1.76	8	25.00	25½	79.69	47	146.87	77	240.63
⅝	1.95	8¼	25.78	26	81.25	47½	148.44	78	243.75
11/16	2.15	8½	26.56	26½	82.81	48	150.00	79	249.87
¾	2.34	8¾	27.34	27	84.38	48½	151.56	80	250.00
13/16	2.54	9	28.13	27½	85.94	49	153.12	81	253.12
⅞	2.73	9¼	28.91	28	87.5	49½	154.69	82	256.25
15/16	2.93	9½	29.69	28½	89.06	50	156.25	83	259.38
1	3.125	9¾	30.47	29	90.63	50½	157.81	84	262.5
1⅛	3.51	10	31.25	29½	92.19	51	159.38	85	265.63
1¼	3.91	10¼	32.03	30	93.75	51½	160.94	86	268.75
1⅜	4.30	10½	32.81	30½	95.31	52	162.5	87	271.88
1½	4.69	10¾	33.59	31	96.87	52½	164.06	88	275.00
1⅝	5.08	11	34.38	31½	98.44	53	165.63	89	278.13
1¾	5.47	11¼	35.16	32	100.00	53½	167.19	90	281.25
1⅞	5.86	11½	35.94	32½	101.56	54	168.75	91	284.38
2	6.25	11¾	36.72	33	103.12	54½	170.31	92	287.5
2⅛	6.64	12	37.5	33½	104.69	55	171.88	93	290.66
2¼	7.03	12½	39.06	34	106.25	55½	173.44	94	293.75
2⅜	7.42	13	40.63	34½	107.81	56	175.00	95	296.87
2½	7.81	13½	42.19	35	109.38	56½	176.56	96	300.00
2⅝	8.20	14	43.75	35½	110.94	57	178.13	97	303.13
2¾	8.59	14½	45.31	36	112.5	57½	179.69	98	306.25
2⅞	8.98	15	46.87	36½	114.06	58	181.25	99	309.38
3	9.38	15½	48.44	37	115.63	58½	182.81	100	312.5
3¼	10.16	16	50.00	37½	117.19	59	184.38	101	315.63
3½	10.94	16½	51.56	38	118.75	59½	185.94	102	318.75
3¾	11.72	17	53.12	38½	120.31	60	187.5	103	322.88
4	12.5	17½	54.69	39	121.88	61	190.63	104	325.00
4¼	13.28	18	56.25	39½	123.44	62	193.75	105	328.13
4½	14.06	18½	57.81	40	125.00	63	196.87	106	331.25
4¾	14.84	19	59.38	40½	126.56	64	200.00	107	334.38
5	15.63	19½	60.94	41	128.13	65	203.125	108	337.5
5¼	16.41	20	62.5	41½	129.69	66	206.25	109	340.63
5½	17.19	20½	64.06	42	131.25	67	209.38	110	343.75
5¾	17.97	21	65.63	42½	132.81	68	212.5	111	346.87
								112	350.00

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

WEIGHT OF CAST IRON COLUMNS.

PER LINEAL FOOT OF PLAIN SHAFT.

Diam.	THICKNESS OF METAL.											
	¼ in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1⅛ in.	1¼ in.	1⅜ in.	1¾ in.	2 in.
2	4.3	6.0	7.4	8.4	9.2	9.7	9.8	.....	.....	.....	.....	.....
2½	5.5	7.8	9.8	11.5	12.9	14.0	14.7	.....	.....	.....	.....	.....
3	6.8	9.7	12.3	14.6	16.6	18.3	19.6	.....	.....	.....	.....	.....
3½	8.0	11.5	14.7	17.6	20.3	22.6	24.6	.....	.....	.....	.....	.....
4	9.2	13.3	17.2	20.7	23.9	26.8	29.5	.....	.....	.....	.....	.....
4½	10.4	15.2	19.6	23.8	27.6	31.1	34.4	37.3	39.9	.....	.....	.....
5	11.7	17.0	22.1	26.9	31.3	35.4	39.3	42.8	46.0	.....	.....	.....
5½	12.9	18.9	24.5	29.9	35.0	39.7	44.2	48.3	52.2	.....	.....	.....
6	14.1	20.7	27.8	33.0	38.7	44.0	49.1	53.9	58.3	.....	.....	.....
6½	15.3	22.6	29.5	36.1	42.3	48.3	54.0	59.4	64.4	.....	.....	.....
7	16.6	24.4	31.9	39.1	46.0	52.6	58.9	64.9	70.6	81.0	.....	.....
7½	17.8	26.2	34.4	42.2	49.7	56.9	63.8	70.4	76.7	88.4	.....	.....
8	19.0	28.1	36.8	45.3	53.4	61.2	68.7	75.9	82.8	95.7	.....	.....
8½	20.2	29.9	39.3	48.3	57.1	65.5	73.6	81.5	89.0	103.1	.....	.....
9	21.5	31.8	41.7	51.4	60.8	69.8	78.5	87.0	95.1	110.5	.....	.....
9½	22.7	33.6	44.2	54.5	64.4	74.1	83.5	92.5	101.2	117.8	133.2	.....
10	23.9	35.4	46.6	57.5	68.1	78.4	88.4	98.0	107.4	125.2	141.7	157.1
10½	25.2	37.3	49.1	60.6	71.8	82.7	93.3	103.5	113.5	132.5	150.3	166.9
11	26.4	39.1	51.6	63.7	75.5	87.0	98.2	109.1	119.7	139.9	158.9	176.7
11½	27.6	41.0	54.8	66.7	79.2	91.3	103.1	114.6	125.8	147.3	167.5	186.5
12	28.8	42.8	56.5	69.8	82.8	95.6	108.0	120.1	131.9	154.6	176.1	196.3
12½	.....	44.6	58.9	72.9	86.5	99.9	112.9	125.6	138.1	162.0	184.7	206.2
13	.....	46.5	61.4	75.9	90.2	104.2	117.8	131.2	144.2	169.4	193.3	216.0
13½	.....	.....	63.8	79.0	93.9	108.5	122.7	136.7	150.3	176.7	201.9	225.8
14	.....	.....	66.3	82.1	97.6	112.8	127.6	142.2	156.5	184.1	210.5	235.6
14½	.....	.....	68.7	85.2	101.2	117.0	132.5	147.7	162.6	191.4	219.1	245.4
15	.....	.....	71.2	88.2	104.9	121.3	137.5	153.2	168.7	198.8	227.6	255.2
16	.....	.....	76.1	94.3	112.3	129.9	147.3	164.3	181.0	213.5	244.8	274.9
17	.....	.....	81.0	100.5	119.7	138.5	157.1	175.3	193.3	228.3	262.0	294.5
18	.....	.....	85.9	106.6	127.0	147.1	166.9	186.4	205.6	243.0	279.2	314.1
19	.....	.....	90.8	112.8	134.4	155.7	176.7	197.4	217.8	257.7	296.4	333.8
20	.....	.....	95.7	118.9	141.7	164.3	186.5	208.5	230.1	274.4	313.5	353.4

INCREASE IN WEIGHT FOR ½ IN. INCREASE IN DIAMETER.

¼ in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1⅛ in.	1¼ in.	1⅜ in.	1¾ in.	2 in.
1.2	1.8	2.5	3.1	3.7	4.3	4.9	5.5	6.1	7.4	8.6	9.8

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Weight of Square or Rectangular Cast Iron Column Shafts per lineal foot.

EXAMPLE:—Column 6″ × 10″ × 1″ × 10′ 0″. 6″+10″ = 16″ × 2 = 32. Following out line on which 32 is found in left hand column to column headed 1″, we find the weight per foot to be 87.5 pounds, which multiplied by 10′ 0″=875 pounds.

A / 2a + B + 2b	METAL.								
	⅝″	¾″	⅞″	1″	1⅛″	1¼″	1½″	1¾″	2″
12	18.6	21.1	23.3	25.0	26.4	27.3	28.1	.....	.....
14	22.5	25.8	28.7	31.3	33.4	35.1	37.5	.....	.....
16	26.4	30.5	34.2	37.5	40.4	43.0	46.9	49.2	50.0
18	30.3	35.2	39.7	43.8	47.4	50.8	56.3	60.2	62.5
20	34.2	39.8	45.1	50.0	54.5	58.6	65.6	71.1	75.0
22	38.1	44.5	50.6	56.3	61.5	66.4	75.0	82.0	87.5
24	42.0	49.2	56.1	62.5	68.5	74.2	84.4	93.0	100.0
26	45.9	53.9	61.5	68.8	75.6	82.0	93.8	103.9	112.5
28	49.8	58.6	67.0	75.0	82.6	89.8	103.7	114.8	125.0
30	53.7	63.3	72.5	81.3	89.6	97.7	112.5	125.8	137.5
32	57.6	68.0	77.9	87.5	96.7	105.5	121.9	137.7	150.0
34	61.5	72.7	83.4	93.8	103.7	113.3	131.3	147.7	162.5
36	65.4	77.3	88.9	100.0	110.7	121.1	140.6	158.6	175.0
38	69.3	82.0	94.3	106.3	117.8	128.9	150.0	169.5	187.5
40	73.2	86.7	99.8	112.5	124.8	136.7	159.4	180.5	200.0
42	77.1	91.4	105.3	118.8	131.8	144.5	168.8	191.4	212.5
44	81.0	96.1	110.8	125.0	138.8	152.3	178.1	202.3	225.0
46	84.9	100.8	116.2	131.3	145.9	160.2	187.5	213.3	237.5
48	88.8	105.5	121.7	137.5	152.9	168.0	196.9	224.2	250.0
50	92.8	110.2	127.2	143.8	159.9	175.8	206.3	235.2	262.5
52	96.7	114.8	132.6	150.0	167.0	183.6	215.6	246.3	275.0
54	100.6	119.5	138.1	156.3	174.0	141.4	225.0	257.0	287.6
56	104.5	124.2	143.6	162.5	181.0	199.2	234.4	268.0	300.0
58	108.4	128.9	149.0	168.8	188.1	207.0	243.8	278.9	312.5
60	112.3	133.6	154.5	175.0	195.1	214.9	253.2	289.8	325.0
62	116.2	138.3	160.0	181.3	202.1	222.7	262.5	300.8	337.5
64	120.1	143.0	165.4	187.5	209.2	230.5	271.9	311.7	350.0
66	124.0	147.7	170.9	193.8	216.2	238.3	281.3	322.7	362.5
68	127.9	152.3	176.4	200.0	223.2	246.1	290.6	336.6	375.0
70	131.8	157.0	181.8	206.3	230.3	253.9	300.0	344.5	387.5
72	135.7	161.7	187.7	212.5	237.3	261.7	309.4	355.5	400.0
74	139.5	166.4	192.8	218.8	244.3	269.5	318.8	366.4	412.5
76	143.5	171.1	198.3	225.0	251.3	277.3	328.1	377.3	425.0
78	147.4	175.8	203.7	231.3	258.4	285.2	337.5	383.3	437.5
80	151.3	180.5	209.2	237.5	265.4	293.0	340.9	399.2	450.0

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

WEIGHTS OF CAST IRON PIPES.

Weights, per foot, of Cast Iron Pipes in general use, including Socket and Spigot ends.

Diameter.	Thickness.	Weight per foot.	Diameter.	Thickness.	Weight per foot.
2 inches.	¼+ inch.	6¼ lbs.	14 inches.	⅞ inch.	138 lbs.
2 "	⅜ "	9¼ "	16 "	½ "	85 "
2 "	½ "	14 "	16 "	⅝ "	108 "
3 "	¼+ "	11 "	16 "	¾ "	129 "
3 "	⅜ "	13½ "	16 "	⅞ "	152 "
3 "	½ "	18 "	16 "	1 "	175 "
3 "	⅝ "	23 "	18 "	⅝ "	114 "
4 "	⅜+ "	16½ "	18 "	¾ "	137 "
4 "	½ "	23 "	18 "	⅞ "	161 "
4 "	⅝ "	31 "	20 "	⅝ "	132 "
6 "	⅜ "	25 "	20 "	¾ "	160 "
6 "	½ "	33 "	20 "	⅞ "	197 "
6 "	⅝ "	42½ "	20 "	1 "	215 "
6 "	¾ "	52 "	24 "	⅝ "	159 "
8 "	⅜ "	40 "	24 "	¾ "	190 "
8 "	½ "	43½ "	24 "	⅞ "	224 "
8 "	⅝ "	56 "	24 "	1 "	257 "
8 "	¾ "	68 "	30 "	¾ "	237 "
10 "	7/16+ "	50 "	30 "	⅞ "	277 "
10 "	½ "	54 "	30 "	1 "	319 "
10 "	⅝ "	68 "	30 "	1⅛ "	360 "
10 "	¾ "	80 "	36 "	⅞ "	332 "
12 "	½ "	67 "	36 "	1 "	381 "
12 "	⅝ "	82 "	36 "	1⅛ "	429 "
12 "	¾ "	99 "	36 "	1¼ "	479 "
12 "	⅞ "	117 "	48 "	1 "	512 "
14 "	½ "	74 "	48 "	1⅛ "	584 "
14 "	⅝ "	94 "	48 "	1¼ "	685 "
14 "	¾ "	113 "	48 "	1½ "	775 "

We make a full line of Special Castings for gas or water pipe from 4 inches to 36 inches diameter, with either bell and spigot or flange ends.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

STRENGTH OF COLUMNS.

Table of ultimate strength per square inch of Hollow Cylindrical and Rectangular Cast Iron Columns.
For different proportions of length in feet (= l).
To least diameter or side in inches (= d).
Ultimate strength in lbs. per square inch =

ROUND CAST IRON COLUMN.

Square Bearing.

$$\frac{80000}{1+\frac{(12\,l)^2}{800d^2}}$$

SQUARE CAST IRON COLUMN.

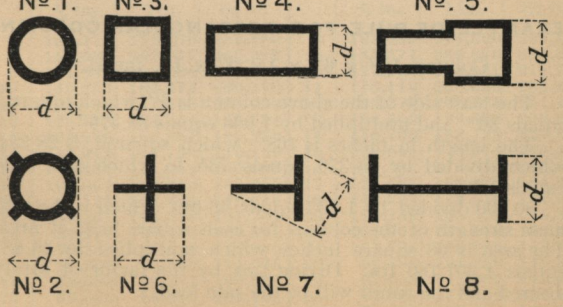
Square Bearing.

$$\frac{80000}{1+\frac{(12\,l)^2}{1066d^2}}$$

To obtain safe resistance:
For quiescent loads (buildings) divide by 6.

$\frac{l}{d}$	Round Cast Iron Column. Square.	$\frac{l}{d}$	Round Cast Iron Column. Square.	$\frac{l}{d}$	Square Cast Iron Column. Square.	$\frac{l}{d}$	Square Cast Iron Column. Square.
1.0	67800	2.3	40980	1.0	70479	2.3	46659
1.1	65690	2.4	39280	1.1	68760	2.4	44991
1.2	63530	2.5	37650	1.2	66973	2.5	43337
1.3	61340	2.6	26090	1.3	65131	2.6	41816
1.4	59140	2.7	34600	1.4	63252	2.7	40305
1.5	56940	2.8	33180	1.5	61352	2.8	38852
1.6	54760	2.9	31820	1.6	59443	2.9	37452
1.7	52620	3.0	30530	1.7	57538	3.0	36105
1.8	50530	3.1	29310	1.8	55646	3.1	34801
1.9	48490	3.2	28140	1.9	53775	3.2	33567
2.0	46510	3.3	27030	2.0	51936	3.3	32373
2.1	44600	3.4	25970	2.1	50135	3.4	31231
2.2	42750			2.2	48372		

Ultimate strength in lbs. per square inch.



In place of the foregoing formulas and tables may be used the following :—

RULE FOR ROUND COLUMNS.

Divide the square of the length of columns in inches by 800 times the square of the diameter in inches shown in foregoing cuts, to this result add one (1). Then dividing 80,000 by the above, the result will be the ultimate strength of column per square inch of area.

EXAMPLE OF RULE FOR ROUND COLUMNS.

Column 8″ diam. x 12′ 0″ long x 1″, metal.

The diam. 8″ squared equals 64, which, multiplied by 800, equals 51,200.

The length, 12′, reduced to inches equals 144, which, squared, equals 20,736.

This amount divided by 51,200, equals .405, to which add 1, making 1.405.

80,000 divided by 1.405 equals 56,940, which is the ultimate strength per square inch of area of column. Multiply this by the number of square inches in the area of the column, viz.: 21.99 square inches, and the result is 1,251,615, which is the ultimate strength of the column. Divide this by the factor of safety desired and the result will be the safe load.

RULE FOR RECTANGULAR COLUMNS.

Divide the square of the length of columns in inches by 1,066 times the square of the least side in inches, to this result add one (1). Then dividing 80,000 by the above, the result will be the ultimate strength of column per square inch of area.

EXAMPLE OF RULE FOR RECTANGULAR COLUMN.

Column 12″ x 6″ x 14′ 0″ x 1″, metal.

The least side of the above column is 6″, which squared, equals 36″, and multiplied by 1,066 equals 38,376″.

The length in inches is 168″, which squared, is 28,224, which divided by 38,376, equals .735, to which add 1.00, equals 1.735.

80,000 divided by 1.735 equals 46,685, which is the ultimate strength of the column for each square inch of area. The area is 28 square inches, which multiplied by 46,685 equals 1,307,180 lbs. Divide this by the factor of safety desired and the result will be the safe load.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Round Cast Iron Columns.

Safe Load in Tons of 2,000 pounds. Safety, 6.

These tables are based on Columns made of the best iron, perfectly molded and with both ends turned.

Length.	Outside Diameter, 3 in.		
	½ in.	¾ in.	1 in.
3	44,070	59,890	71,190
4	39,394	53,535	63,636
5	34,579	46,992	55,859
6	30,231	41,083	48,835
7	26,268	35,698	42,433
8	22,812	31,001	36,851
9	19,844	26,967	32,056
10	17,339	23,564	28,010
11	15,147	20,694	24,630
12	13,402	18,213	21,650
13	11,785	16,123	19,223
14	10,469	14,335	17,097
15	9,453	12,847	15,271

Length.	Outside Diameter, 4 in.		
	½ in.	¾ in.	1 in.
4	61,020	85,880	106,220
5	56,140	79,202	98,020
6	51,246	72,124	89,206
7	46,552	65,968	82,035
8	41,858	58,912	72,865
9	37,912	53,303	65,925
10	33,885	47,690	58,985
11	30,701	42,681	53,011
12	27,476	38,671	47,830
13	25,000	34,794	43,167
14	22,464	31,616	39,104
15	20,511	28,567	35,504
16	18,557	26,118	32,304

	Outside Diameter, 5 in.		
	½ in.	¾ in.	1 in.
5	79,100	141,250	113,000
6	74,118	132,353	105,833
7	68,996	123,207	98,566
8	63,886	114,082	91,266
9	58,951	105,270	84,216
10	54,261	96,895	77,516
11	49,875	89,062	71,250
12	45,826	81,832	65,466
13	42,105	75,187	60,150
14	38,710	69,125	55,300
15	35,618	63,603	50,833
16	32,830	58,625	46,900
17	30,298	54,103	43,283
18	28,003	50,006	40,005
19	25,931	46,306	37,045
20	24,056	42,957	34,366

	Outside Diameter, 6 in.		
	¾ in.	1 in.	1¼ in.
6	140,120	177,410	210,180
7	132,782	168,120	199,174
8	125,253	158,587	187,880
9	117,676	148,993	176,514
10	109,945	139,205	164,908
11	103,021	130,438	154,532
12	96,119	121,700	144,179
13	89,612	113,448	134,403
14	83,514	105,739	125,271
15	77,810	98,517	116,715
16	72,532	91,835	108,798
17	67,633	85,632	101,449
18	63,094	79,886	94,642
19	58,962	74,653	88,443
20	55,131	69,803	82,697
21	51,584	65,312	77,376
22	48,348	61,215	72,523
23	45,365	57,438	68,048

	Outside Diameter, 7 in.		
	¾ in.	1 in.	1¼ in.
7	166,110	212,440	255,380
8	158,664	202,917	243,933
9	151,086	193,226	232,282
10	143,283	183,375	220,440
11	135,769	173,636	208,733
12	128,198	163,954	197,094
13	120,936	154,667	185,930
14	113,948	145,730	175,186
15	107,324	137,258	165,002
16	101,062	129,250	155,375
17	95,123	121,654	146,244
18	89,567	114,548	137,701
19	84,275	107,780	129,565
20	79,380	101,520	122,040
21	74,798	95,660	114,995
22	70,589	90,277	108,525
23	66,635	85,220	102,458
24	62,930	80,482	96,750

	Outside Diameter, 8 in.		
	¾ in.	1 in.	1¼ in.
8	193,230	248,600	299,450
9	185,671	238,876	287,737
10	177,942	228,932	275,759
11	170,110	218,856	263,622
12	162,279	208,780	251,485
13	154,359	198,638	239,268
14	146,700	188,738	227,343
15	139,655	179,674	216,425
16	132,552	170,535	205,417
17	125,787	161,832	194,934
18	119,323	153,516	184,917
19	113,150	145,574	175,350
20	107,302	138,050	166,487
21	101,796	130,966	157,754
22	96,580	124,256	149,672
23	91,656	117,920	142,040
24	87,009	111,942	134,839
25	82,695	106,392	128,154

Round Cast Iron Columns.

(CONTINUED.)

Length.	Outside Diameter, 15 in.		
	1 in.	1½ in.	2 in.
15	496,974	718,793	922,884
16	486,727	703,972	903,953
17	476,259	688,833	884,513
18	465,654	673,566	864,910
19	454,973	658,045	844,980
20	444,242	642,525	825,050
21	433,467	626,940	805,038
22	422,736	611,419	785,108
23	412,005	595,898	765,178
24	401,405	580,568	745,493
25	390,938	565,429	726,054
26	380,559	550,417	706,777
27	370,400	535,733	687,909
28	360,240	521,220	669,286
29	350,565	507,035	651,071
30	340,933	493,105	633,183
31	330,921	479,492	615,704
32	322,329	466,198	598,633

Length.	Outside Diameter, 16 in.		
	1½ in.	2 in.	2½ in.
16	772,129	993,648	1,198,139
17	757,143	974,785	1,175,918
18	741,995	955,158	1,151,380
19	726,521	935,397	1,127,523
20	711,042	915,312	1,103,348
21	695,394	895,149	1,079,067
22	679,610	874,750	1,054,574
23	664,031	854,795	1,030,400
24	648,452	834,740	1,006,225
25	632,941	814,773	982,156
26	617,567	794,982	958,299
27	602,329	775,367	934,657
28	587,296	756,016	911,328
29	572,537	737,017	888,365
30	557,983	718,281	865,841
31	543,702	699,918	843,681
32	529,694	681,866	822,345
33	515,960	664,186	800,633

	Outside Diameter, 17 in.		
	1½ in.	2 in.	2½ in.
17	825,352	1,065,025	1,286,844
18	809,752	1,045,798	1,263,612
19	795,333	1,026,198	1,240,039
20	779,994	1,006,495	1,216,125
21	764,510	986,515	1,191,982
22	748,952	966,439	1,167,726
23	733,332	946,270	1,143,355
24	717,618	226,006	1,118,871
25	702,060	905,931	1,094,615

	Outside Diameter, 17 in.		
	1½ in.	2 in.	2½ in.
26	686,503	885,856	1,070,358
27	671,018	865,875	1,046,216
28	655,753	846,176	1,022,415
29	640,634	825,667	998,841
30	625,661	807,345	975,496
31	610,907	788,307	952,492
32	596,455	769,645	929,944
33	582,132	744,267	907,737
34	566,206	730,626	882,798

NEW STEEL RAILS USED AS LINTELS OR GIRDERS.

Safe load in tons of 2000 lbs.

Length.....	2	3	4	5	6	7	8	9
52 lb. rail, per yard	10.75	7.00	5.50	4.25	3.50	3.	2.75	2.50
60 lb. rail, yer yard	12.	8.00	5.65	4.75	4.00	3.50	3.	2.70
Deflection in inches	0.045	0.050	0.075	0.090	0.125	0.170	0.225	0.300

Length.....	10	11	12	13	14	15	16	
52 lb. rail, per yard	2.	1.90	1.80	1.70	1.50	1.40	1.30	
60 lb. rail, per yard	2.40	2.20	2.	1.80	1.70	1.60	1.50	
Deflection in inches	0.375	0.450	0.535	0.630	0.730	0.830	0.930	

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Square Cast Iron Columns.

Safe Load in Pounds. Safety, 6.

BOTH ENDS TURNED.

Length.	Outside Size Column, 8x8.			Length.	Outside Size Column, 10x10.		
	¾ in.	1 in.	1½ in.		¾ in.	1 in.	1½ in.
8	255,485	328,902	458,113	10	325,965	422,874	599,071
9	247,656	318,822	444,073	11	318,015	412,560	584,460
10	239,457	308,266	429,370	12	309,751	401,839	569,272
11	231,785	298,430	415,670	13	301,232	390,787	553,615
12	222,400	286,308	398,787	14	292,540	379,512	537,662
13	213,752	275,176	383,280	15	283,752	368,111	521,790
14	204,896	263,774	267,399	16	274,925	356,659	505,267
15	196,642	253,153	252,606	17	266,109	345,229	489,075
16	188,268	242,368	337,584	18	257,362	333,875	472,989
17	180,126	231,887	322,986	19	248,709	322,650	457,087
18	172,220	221,709	308,810	20	240,204	311,616	441,456
19	164,589	211,884	295,125	21	231,873	300,809	426,146
20	157,242	202,426	281,950	22	223,720	290,232	411,162
21	150,225	193,354	269,314	23	215,881	280,062	396,754
22	143,452	184,674	257,224	24	208,083	269,946	382,423
23	137,014	176,376	245,552	25	200,619	260,263	368,704
24	130,881	168,490	234,682	26	193,398	250,895	355,434
25	125,349	160,809	223,985	27	186,411	241,830	342,592

	Outside Size Column, 12x12.				Outside Size Column, 12x12.		
	1 in.	1½ in.	2 in.		1 in.	1½ in.	2 in.
12	516,846	740,029	939,720	21	414,986	594,184	754,520
13	506,383	725,048	920,696	22	403,458	577,678	733,560
14	495,550	709,537	901,000	23	392,093	561,406	712,896
15	484,418	693,598	880,765	24	380,864	545,328	692,480
16	473,057	677,332	860,104	25	369,829	529,527	672,416
17	461,579	660,838	839,160	26	359,005	514,030	652,736
18	449,913	644,194	818,024	27	348,401	498,847	633,456
19	438,253	627,499	796,824	28	337,731	483,569	614,056
20	426,593	610,804	775,624	29	329,941	469,552	596,256

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Table of Safe Loads of Cast Iron Columns.

FACTOR OF SAFETY, 10.

This factor of safety of 10 has been adopted to allow for imperfections in casting: such as air-holes, unequal thickness of metal, etc, deviation of pressure from axis of columns, and the effect of lateral forces accidentally applied. Where these risks do not occur a factor of 6 may be taken for safe load. Ends of columns should always be turned true.

Outside Diameter in inches.	Thickness of Metal.	LENGTH OF COLUMNS IN FEET. Both Ends Turned.														Sectional area in inches.	Weight in lbs. of Columns per foot of length.
		6	8	10	12	14	16	18	20	22	24	26	28	30			
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.			
4	½	11.	8.1	6.1	4.7	3.6	3.4	2.8	2.0	.....	.....	.....	.....	.....		5.492	17.14
	¾	15.2	11.3	8.5	6.5	4.8	3.8	3.3	2.8	.....	.....	.....	.....	.....		7.66	23.90
5	½	16.8	13.3	10.4	8.3	6.7	5.4	5	4	.....	.....	.....	.....	.....		7.07	22.06
	¾	24	19	15	12	9	7.7	6.5	5.7	.....	.....	.....	.....	.....		10.01	31.23
6	½	23	19	15.5	12.7	9.5	8.7	7.3	6.2	.....	.....	.....	.....	.....		8.64	26.95
	¾	33	27	22	18	15	13	11	9	.....	.....	.....	.....	.....		12.37	38.59
	⅞	37	31	25	21	17	14	12	10	.....	.....	.....	.....	.....		14.09	43.96
1		42	35	28	23	19	16	13	11	.....	.....	.....	.....	.....		15.71	49.01
1⅛		47	40	32	26	22	18	14	12	.....	.....	.....	.....	.....		17.23	53.76
7	⅝	36	31	26	22	19	16	13	11	.....	10	.....	.....	.....		12.52	39.06
	¾	42	36	31	26	22	19	16	13	11	11	.....	.....	.....		14.73	45.96
	⅞	48	41	35	29	25	21	18	15	13	12	.....	.....	.....		16.84	52.54
1		54	46	39	33	28	24	20	17	14	13	.....	.....	.....		18.85	58.90
1⅛		60	52	44	37	32	27	23	19	16	13	.....	.....	.....		20.76	64.77
8	¾	51	45	39	34	29	25	22	19	16	14	18	16	15		17.08	53.29
	⅞	59	52	45	39	34	29	25	22	19	16	20	18	.....		19.59	61.12
1		66	58	51	44	38	33	28	24	21	18	.....	.....	.....		21.99	68.64
1⅛		73	64	56	48	42	36	31	26	23	20	.....	.....	.....		24.30	75.82
1¼		79	70	61	52	45	39	34	29	25	22	.....	.....	.....		26.51	82.71
1⅜		86	76	66	57	48	42	37	32	27	24	.....	.....	.....		28.62	89.29
9	¾	60	54	49	43	37	33	29	24	22	20	18	16	.....		19.44	60.65
	⅞	69	63	56	49	43	38	33	29	26	23	20	18	15		22.33	69.97

BOUTON · FOUNDRY · COMPANY,

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Table of Safe Loads of Cast Iron Columns.

FACTOR OF SAFETY, 10.

This factor of safety of 10 has been adopted to allow for imperfections in casting: such as air-holes, unequal thickness of metal, etc., deviation of pressure from axis of columns, and the effect of lateral forces accidentally applied. Where these risks do not occur a factor of 6 may be taken for safe load. Ends of columns should always be turned true.

Outside Diameter in inches.	Thickness of Metal.	LENGTH OF COLUMNS IN FEET. Both Ends Turned.													Sectional area in inches.	Weight in lbs. of foot of length.
		6	8	10	12	14	16	18	20	22	24	26	28	30		
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.		
9	1	78	71	63	55	48	42	37	33	29	26	23	20	17	25.13	78.40
	1 1/8	87	78	69	62	53	47	41	36	32	29	25	22	19	27.83	86.83
	1 1/4	95	85	76	67	58	51	45	39	35	32	28	25	22	30.43	94.94
	1 3/8	102	92	82	72	63	55	48	43	39	35	31	27	23	32.94	102.77
	1 1/2	110	99	88	78	68	59	52	46	42	38	34	30	26	35.34	110.26
	1 5/8	118	106	94	84	73	63	56	49	45	41	37	33	29	37.65	117.47
	1 3/4	126	113	100	90	78	67	60	51	48	44	40	36	32	39.86	124.36
10	7/8	80	73	67	60	53	47	42	37	34	30	27	24	21	25.09	78.28
	1	90	83	75	67	60	53	47	42	38	34	30	27	24	28.28	88.23
	1 1/8	100	92	83	74	66	58	52	47	42	38	34	30	26	31.37	97.97
	1 1/4	110	101	91	82	73	64	57	51	47	42	38	33	29	34.37	107.23
	1 3/8	119	109	98	88	79	69	62	55	51	46	41	36	31	37.26	116.25
	1 1/2	128	117	106	95	85	75	67	59	54	49	44	39	34	40.06	124.99
	1 5/8	146	133	122	109	97	85	77	67	60	56	50	45	40	45.36	141.52
11	1	102	95	87	79	71	64	58	52	48	43	38	34	30	31.42	98.03
	1 1/8	114	105	96	88	79	71	64	58	53	48	42	37	32	34.90	108.89
	1 1/4	125	116	106	97	87	78	70	63	58	52	46	41	35	38.29	119.46
	1 3/8	135	126	115	105	94	85	76	68	62	56	50	44	38	41.58	129.73
	1 1/2	146	136	124	113	102	92	82	74	67	61	54	48	43	44.77	139.68
	1 3/4	166	156	142	129	118	106	94	86	79	71	62	56	49	50.86	158.68
	2	186	176	160	147	134	120	106	98	90	81	70	64	55	56.55	176.44
12	1	115	107	97	92	83	76	69	62	58	53	48	44	40	34.46	107.51
	1 1/8	128	119	108	102	92	84	78	69	63	58	53	48	43	38.34	119.62
	1 1/4	141	131	119	112	101	93	84	76	70	64	58	52	46	42.12	131.41

BOUTON · FOUNDRY · COMPANY,

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Table of Safe Loads of Cast Iron Columns.

FACTOR OF SAFETY, 10.

This factor of safety of 10 has been adopted to allow for imperfections in casting: such as air-holes, unequal thickness of metal, etc., deviation of pressure from axis of columns, and the effect of lateral forces accidentally applied. Where these risks do not occur a factor of 6 may be taken for safe load. Ends of columns should always be turned true.

Outside Diameter in inches.	Thickness of Metal.	LENGTH OF COLUMNS IN FEET. Both Ends Turned. 6 Tons.	8 Tons.	10 Tons.	12 Tons.	14 Tons.	16 Tons.	18 Tons.	20 Tons.	22 Tons.	24 Tons.	26 Tons.	28 Tons.	30 Tons.	Sectional area in inches.	Weight in lbs. of Columns per foot of length.
12	1 3/8	153	142	129	121	110	101	91	82	75	69	62	56	50	45.80	142.90
	1 1/2	165	154	139	131	119	109	99	89	82	75	68	60	53	49.39	154.10
	1 3/4	189	178	159	150	137	125	115	103	94	85	78	68	60	56.26	175.53
	2	213	201	179	170	155	141	131	117	106	96	88	76	67	62.74	195.75
13	1	127	119	111	104	97	90	81	73	67	61	56	51	46	37.67	117.53
	1 1/8	142	134	126	117	109	101	91	82	75	69	63	58	52	41.94	130.85
	1 1/4	158	149	140	130	121	112	101	91	84	77	70	64	58	46.11	143.86
	1 3/8	174	163	154	144	133	122	111	101	93	84	78	70	64	50.19	156.59
	1 1/2	190	178	168	157	145	133	121	110	101	92	85	77	70	54.16	168.98
	1 3/4	214	201	189	176	164	151	137	124	114	104	95	87	78	61.82	192.88
	2	237	224	210	195	182	168	152	137	126	116	105	96	87	69.09	215.56
14	1	138	131	125	117	109	101	92	85	78	72	66	61	56	40.9	127.60
	1 1/8	153	145	139	130	121	112	103	94	87	80	73	68	62	45.5	141.96
	1 1/4	168	160	153	143	133	123	113	104	95	88	80	74	68	50.1	156.31
	1 3/8	183	174	167	156	145	134	123	113	104	95	87	81	74	54.5	170.04
	1 1/2	198	189	180	168	156	145	133	122	112	103	94	87	80	58.87	183.67
	1 3/4	226	216	206	192	179	166	152	140	128	118	107	99	91	67.31	210.00
	2	254	242	232	216	201	186	171	157	143	132	120	111	102	75.36	235.12
15	1	150	143	136	128	120	112	104	97	90	83	76	71	65	44.00	137.28
	1 1/8	167	159	152	143	136	125	116	108	100	93	85	78	72	49.1	153.19
	1 1/4	184	175	167	157	148	138	128	119	110	102	93	84	79	54.0	168.48
	1 3/8	201	191	182	172	161	151	140	130	120	111	102	93	87	58.9	183.77
	1 1/2	217	207	197	186	175	163	151	141	130	120	110	102	94	63.7	198.74
	1 3/4	248	236	225	212	202	190	175	160	148	137	126	115	107	72.9	227.45

NOTE.

Our retangular or square column patterns are nearly all made so that they can be used as box columns, viz.: or as pilasters with one or two returns, viz.:

In ordering box columns, give the

WIDTH,

DEPTH,

LENGTH BETWEEN PLATES,

THICKNESS OF METAL,

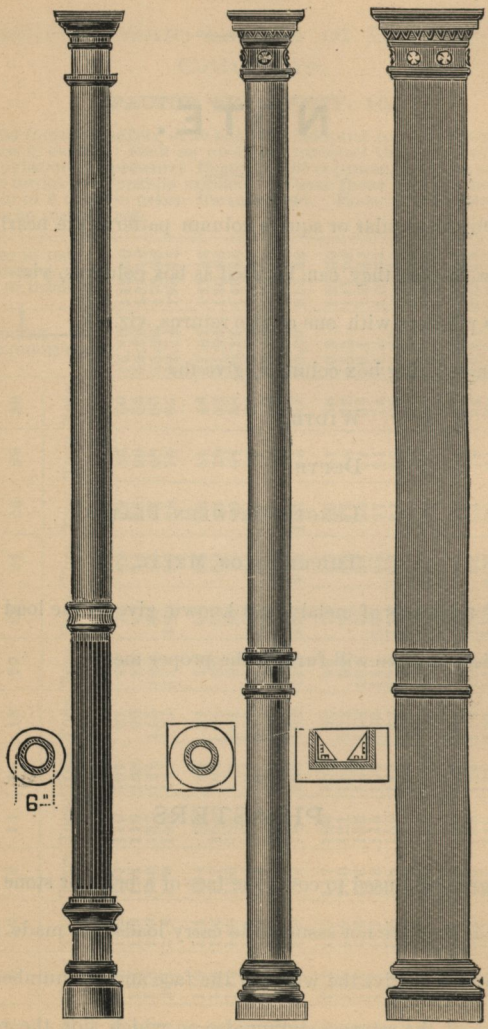
or if thickness of metal is not known, give us the load to be carried, and we will furnish the proper metal.

PILASTERS

are generally used to cover the face of a brick or stone wall, and as they are not assumed to carry loads, are made light. In ordering, give the width of the face and the number and depth of the returns, stating also on which side the return is to be if only one is wanted.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



A

Diam. 6 inches.
" 8 "
" 10 "
" 12 "
" 14 "

X

Diam. 6 inches.
" 8 "
" 10 "
" 12 "
" 14 "

W

Square Column or Pilaster of any size as desired.

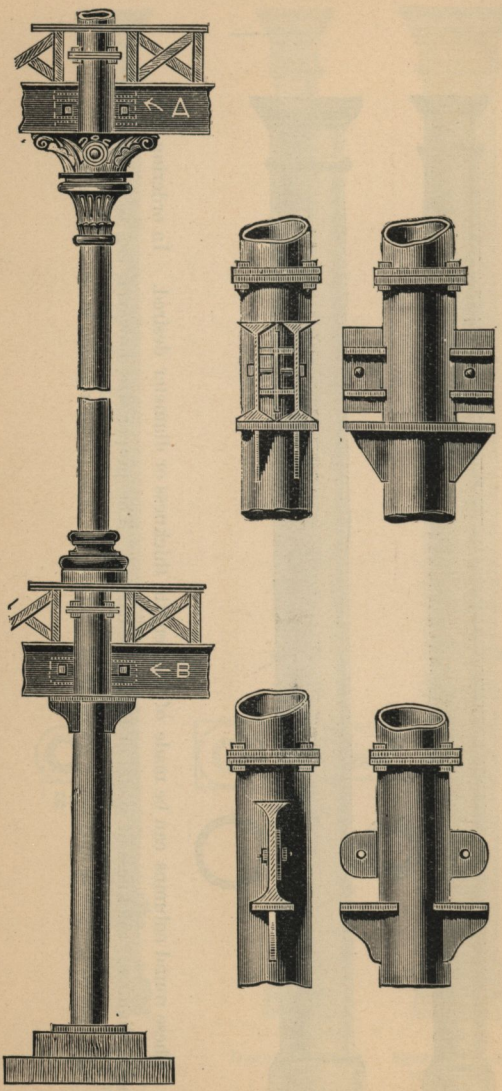
Give thickness of metal or load to be carried.

Cols. L.

These round columns can be made of any length, thickness or diameter desired. In ordering, give length, diameter, thickness of metal or load to be carried. The proper size, however, can be ascertained by reference to the tables entitled, "Strength of Columns." The mouldings can be made as desired.

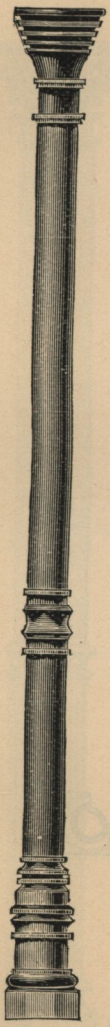
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



Illustrations of connections of columns to columns, and of beams to columns.

As a rule, flanges, brackets and lugs are made of the same thickness as the metal in the column to which they are cast, but in no case less than ¾ of an inch thick. Four ¾ in. bolts connect the columns, and one ¾ in. bolt connects beams to columns.



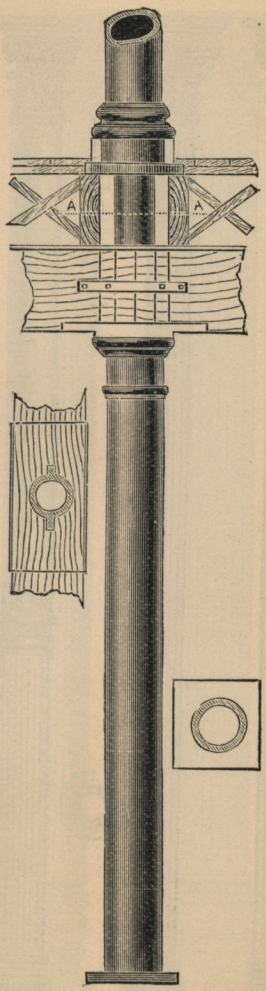


Illustration of connections of interior columns, where a stool or "quill" is used. The quill is shown in elevation at A - - A, and in section lower down at the left of the column.

Column S. Diameter as desired.

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G may be made in pilaster shape with one or two returns or as a column. The returns and back can be fluted if desired or made plain.

Q and I can be made of any size ordered. They can also be made three-quarters.

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F U V

F and V can be made as pilasters or as square or rectangular columns, and of any size wished.

U can be made of any ordinary diameter or length.

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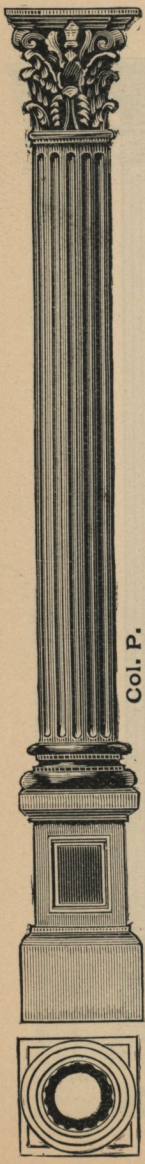
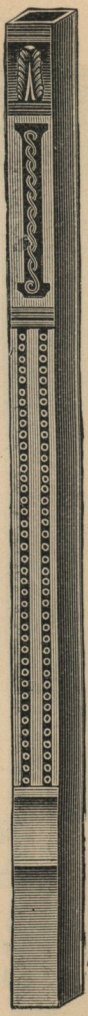
2600 Archer Avenue, Chicago.



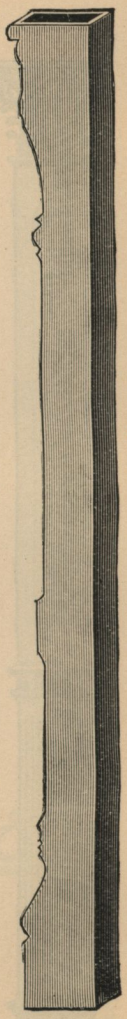
Col. P.

Col. R.

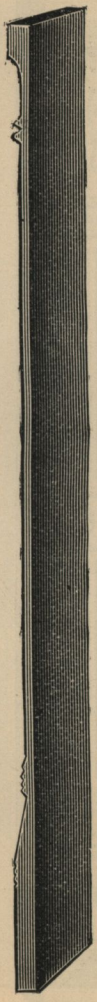


Col. BV.

(Shown further in store front BU.)

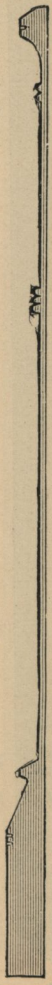


Columns P and R can be made of any reasonable diameters or lengths.



Face, 24 inches down to 4 inches wide, and of any length.

Pilaster
O B



Face, 12 inches down to 6 inches wide, and of any length.

Pilaster
B L

These can be used as faces for box columns, if desired.

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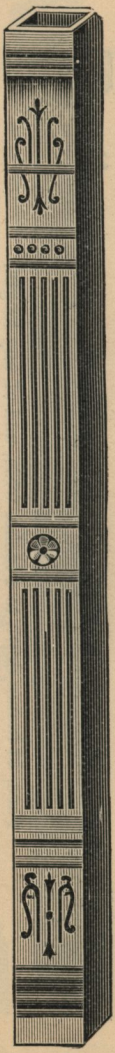

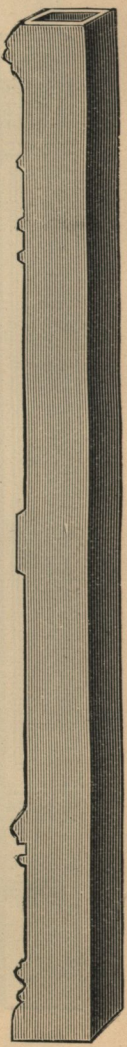

N
Face, 6 in. to 12 in.
Give thickness of metal.

Side.
any depth.

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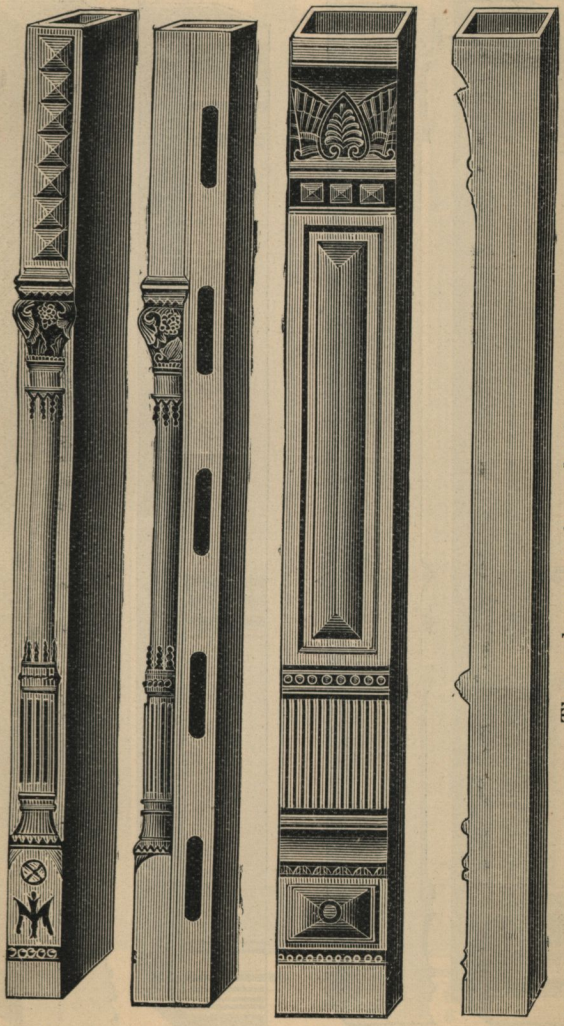

These columns can be made of any length.

M
Face, 7½ in.

Side, 10½ in.

O M
Face, 10 in. to 16 in.
Depth as wanted.

Side.

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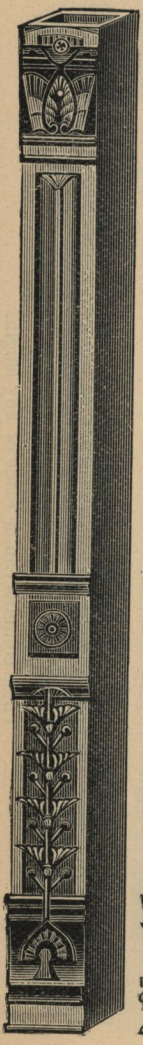
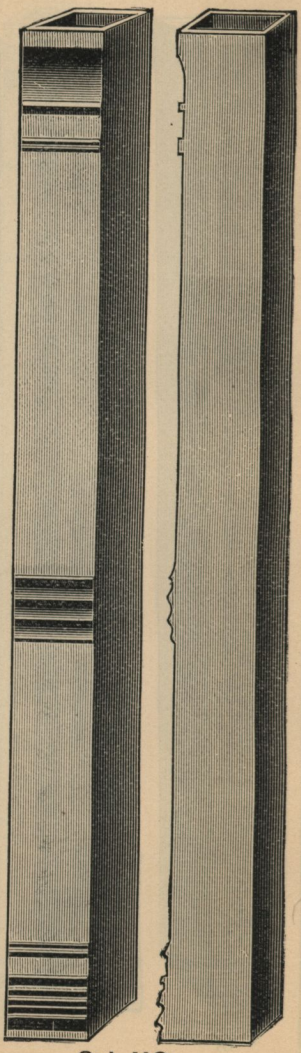


Col. Z.

Face. Side.



Col. HO.

Face. Side.

These columns can be made of any size, length or strength.

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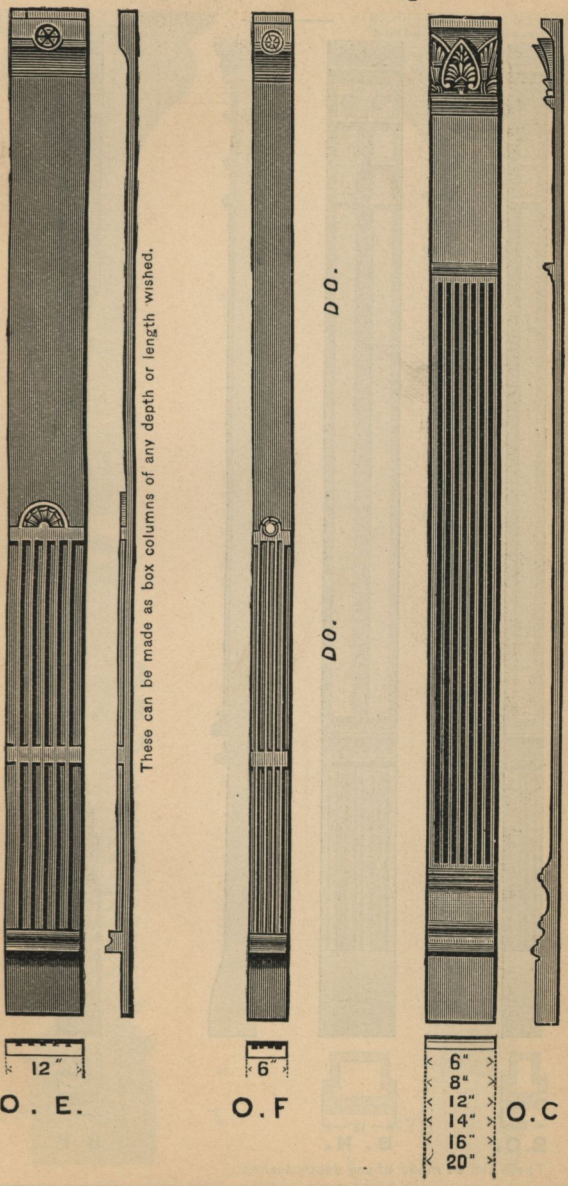
2600 Archer Avenue, Chicago.



O. E.

O. F

O. C

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2600 Archer Avenue, Chicago.

B. O.

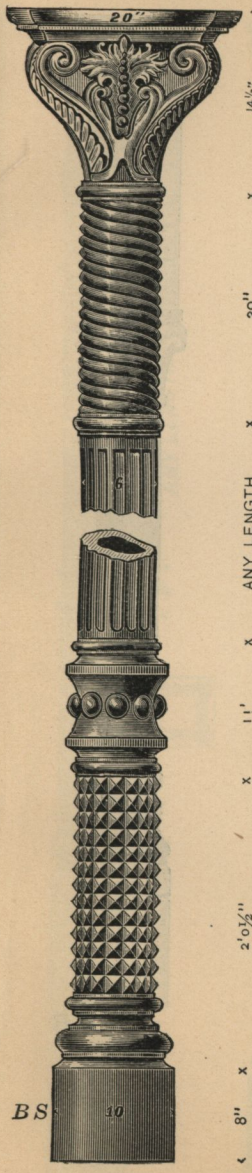
B. N.

B. P.

These can be made of any depth desired.

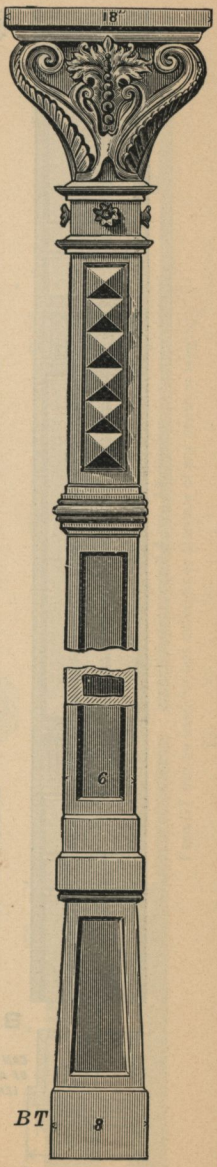
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



BS

8" x 2'0½" x 11" x ANY LENGTH



BT

2'1" x3½"x ANY LENGTH x 4" x 1'9" x 5 x 14½"

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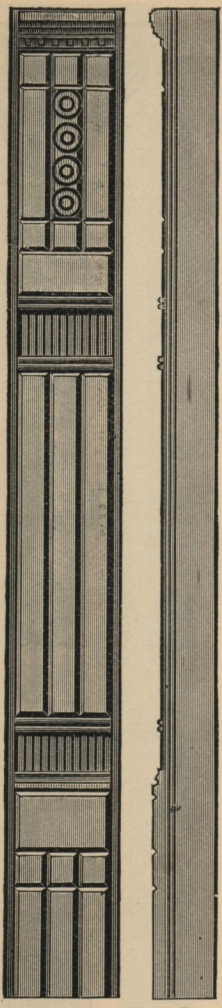
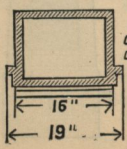
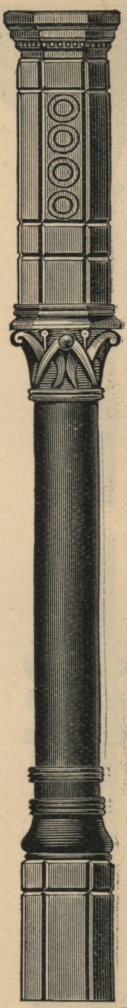


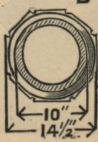
B. Q.



CAN BE MADE OF ANY DEPTH OR LENGTH REQUIRED



B R.



BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Face CT can be used for box columns or pilasters of any depth or length.

NOTE.

The columns on the three following pages are what are called "GAS PIPE or SASH COLUMNS," and are made of Wrought Gas Pipe, cut lengthways for the reception of glass at corners of store fronts. They are not expected to carry weights.

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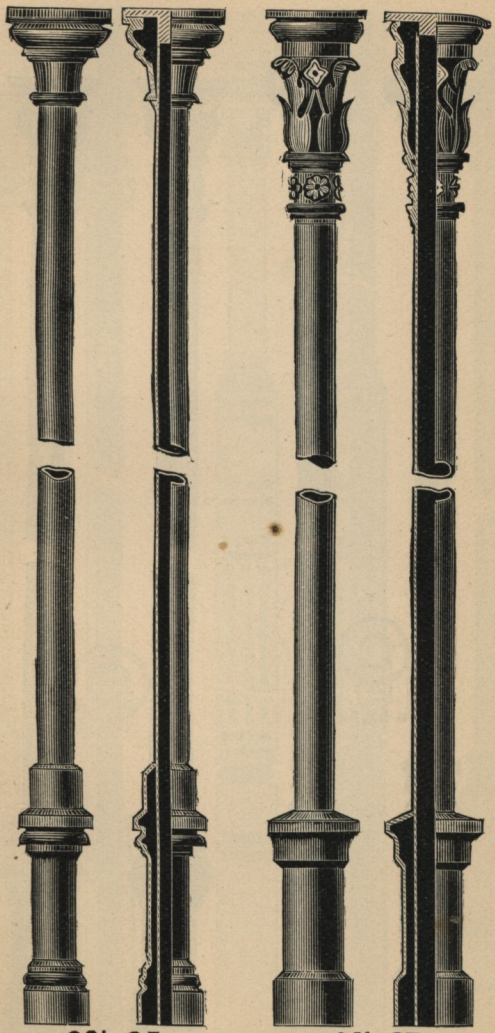
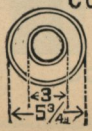
2600 Archer Avenue, Chicago.



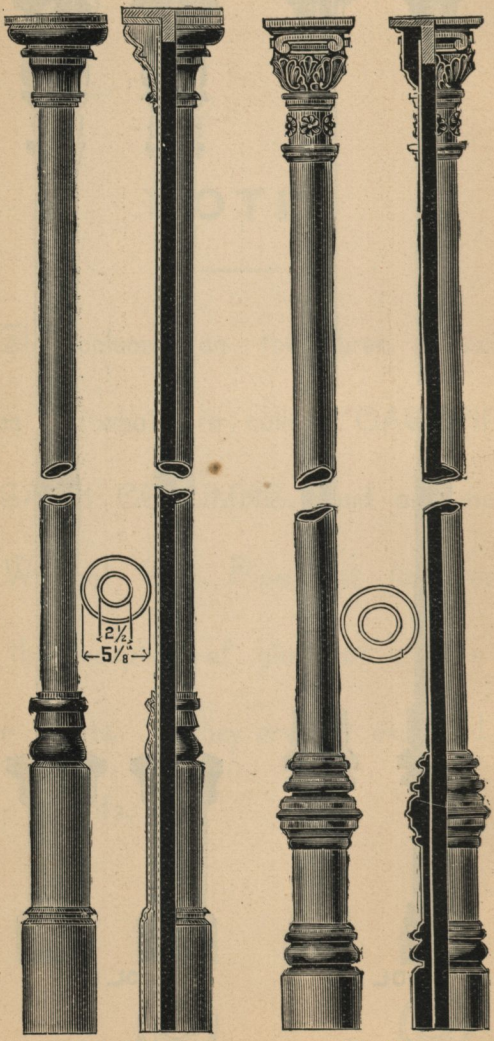
COL. G E.

COL. G F.



BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



Col. GG. Col. GH.

BOUTON · FOUNDRY · COMPANY,

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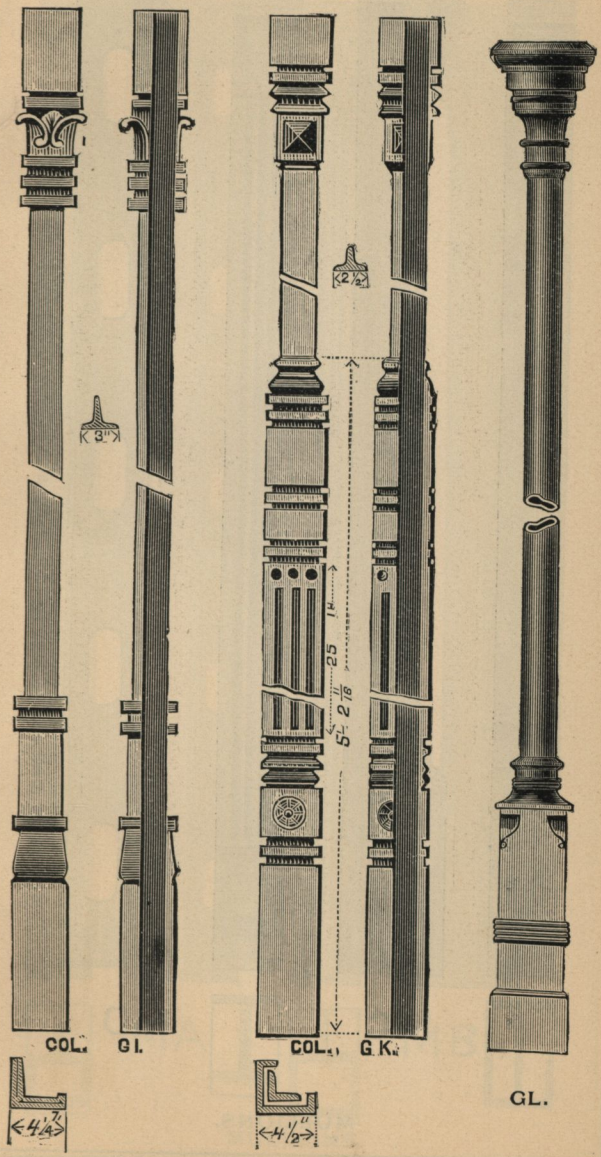
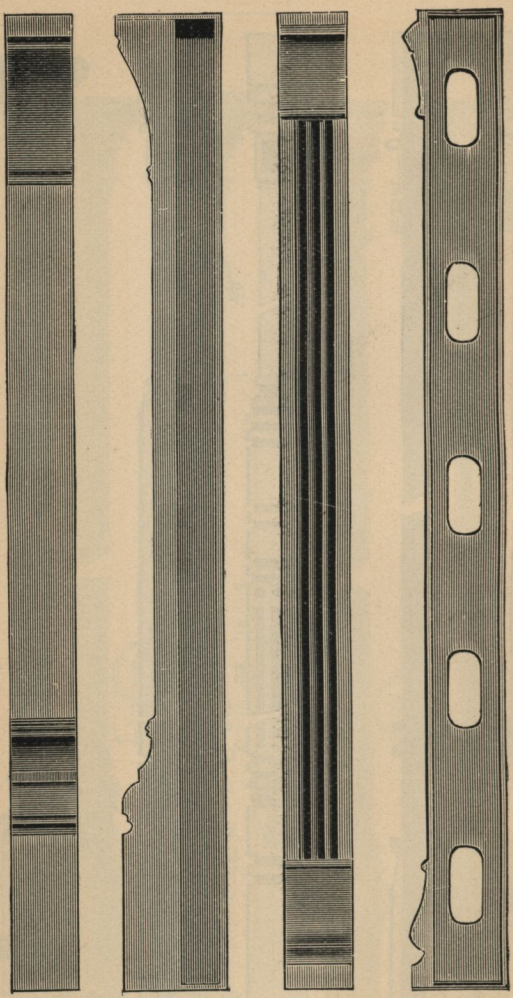
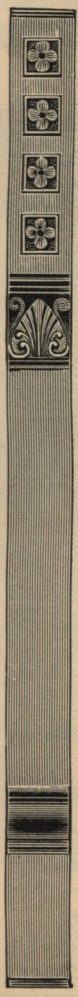
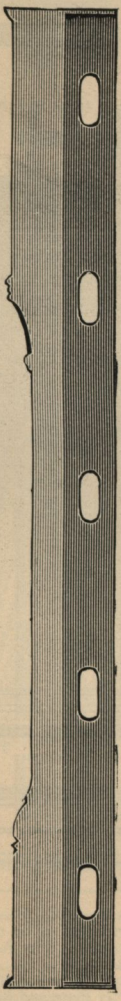


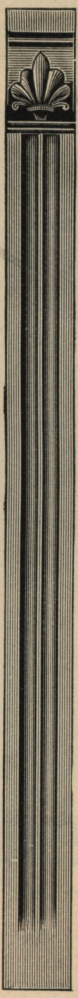


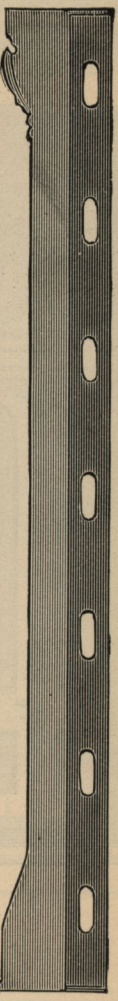
These Mullions are 4 in. to 12 in. face, and of any depth or length required.

MULLIONS.



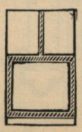






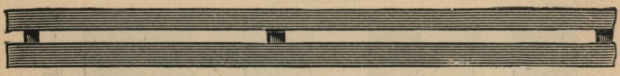
These Mullions are 4 in. to 16 in. face, and of any depth or length required.

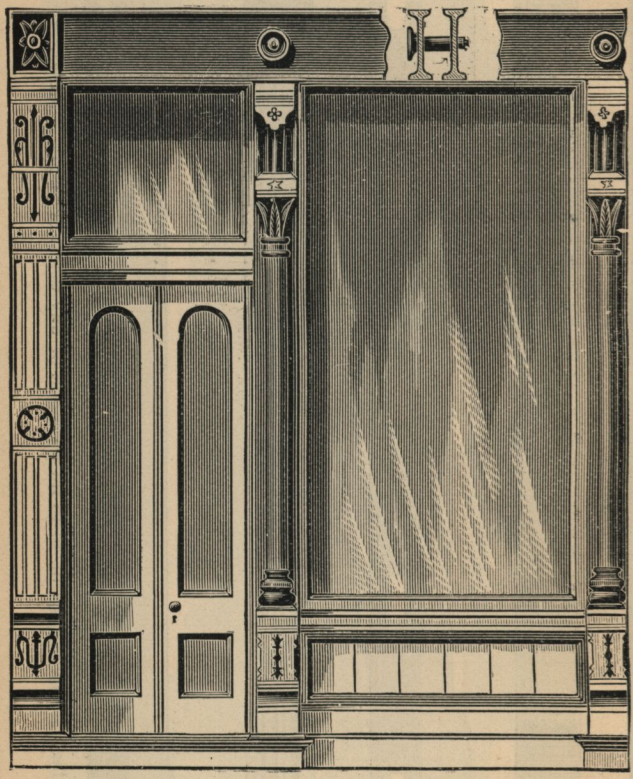
MA

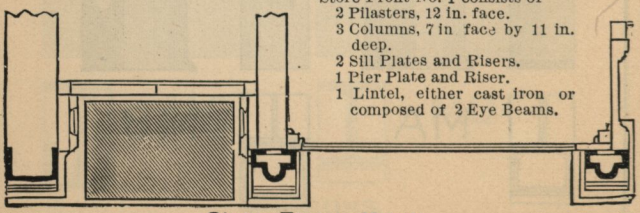


MB

MULLIONS.





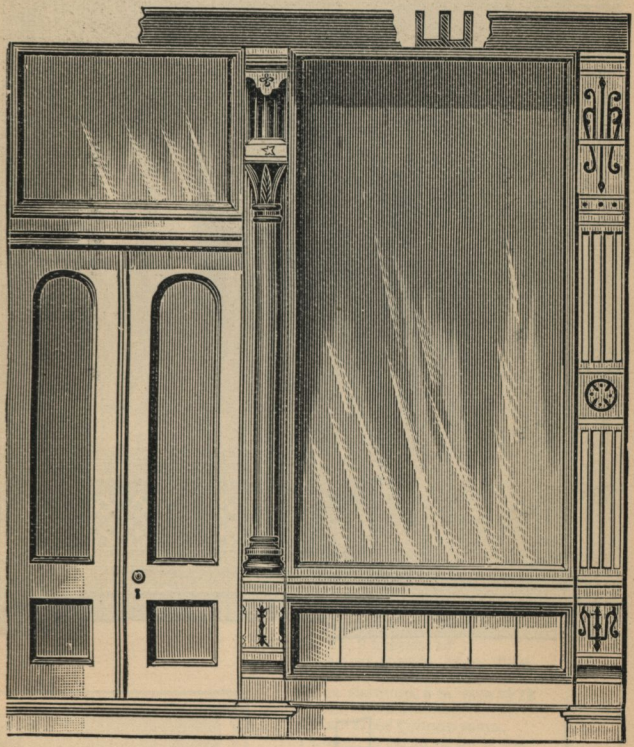


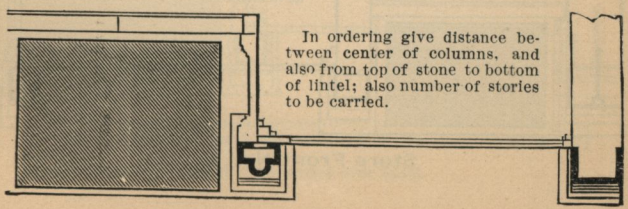
Store Front No. 1 consists of
2 Pilasters, 12 in. face.
3 Columns, 7 in face by 11 in. deep.
2 Sill Plates and Risers.
1 Pier Plate and Riser.
1 Lintel, either cast iron or composed of 2 Eye Beams.

Store Front, No. 1.

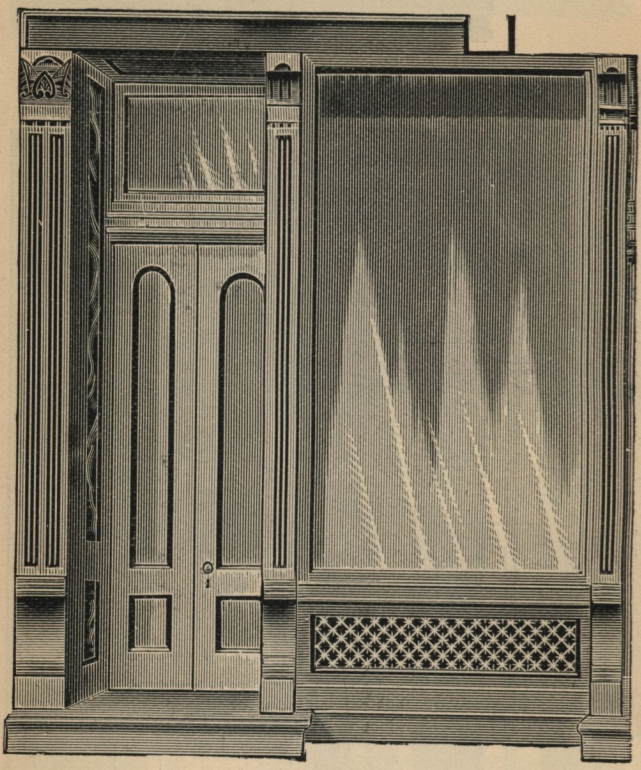
BOUTON · FOUNDRY · COMPANY,

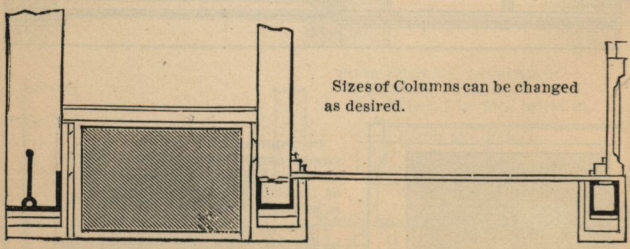
2600 Archer Avenue, Chicago.





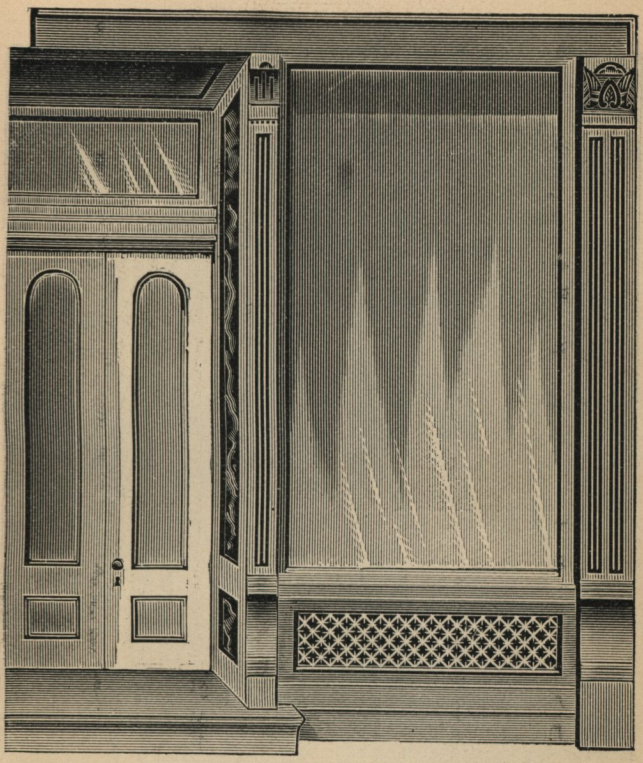
In ordering give distance between center of columns, and also from top of stone to bottom of lintel; also number of stories to be carried.

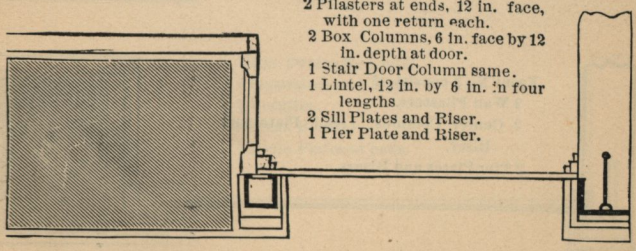




Sizes of Columns can be changed as desired.

Store Front No. 2.

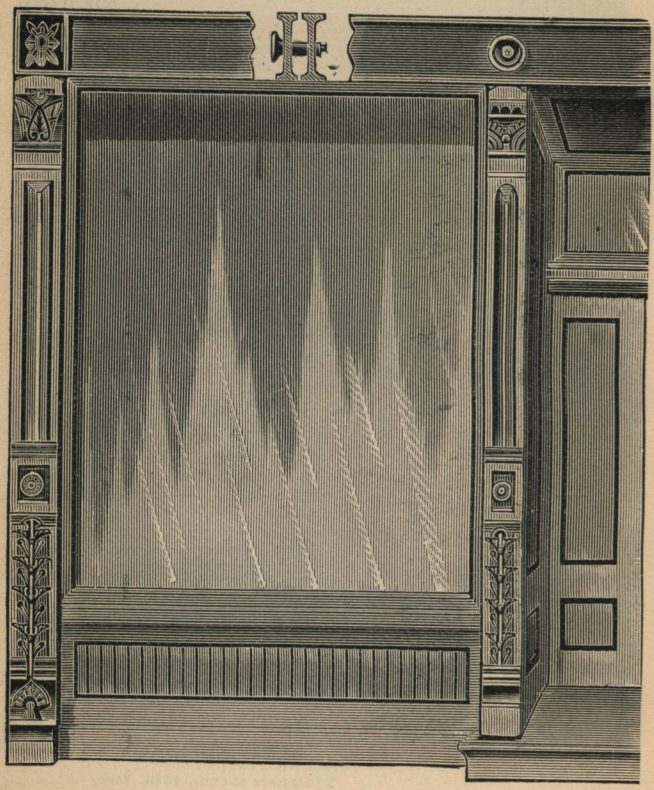


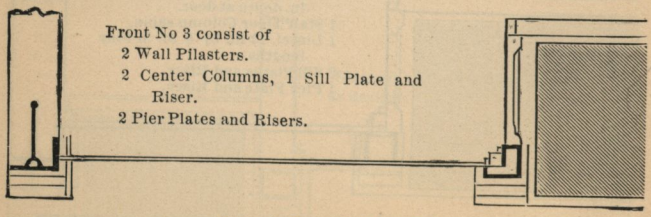


Front No. 2 consists of
2 Pilasters at ends, 12 in. face, with one return each.
2 Box Columns, 6 in. face by 12 in. depth at door.
1 Stair Door Column same.
1 Lintel, 12 in. by 6 in. in four lengths
2 Sill Plates and Riser.
1 Pier Plate and Riser.

In ordering, give distance between centers of columns, and from top of stone to bottom of lintel; also thickness of side wall to be covered by pilasters.

Give number of stories to be carried over lintel.





Front No 3 consist of
2 Wall Pilasters.
2 Center Columns, 1 Sill Plate and Riser.
2 Pier Plates and Risers.

Store Front No. 3.

A cast iron lintel may be used, if wished.

BOUTON · FOUNDRY · COMPANY,

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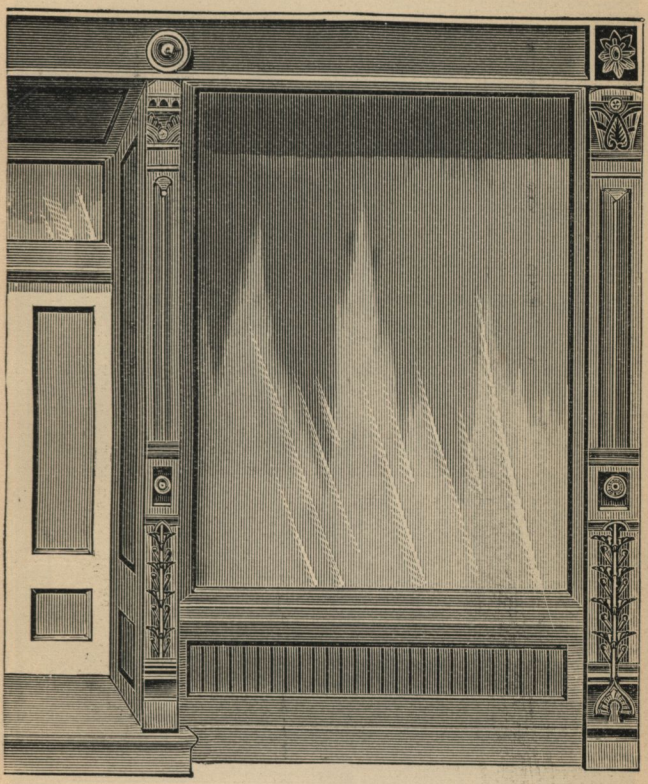
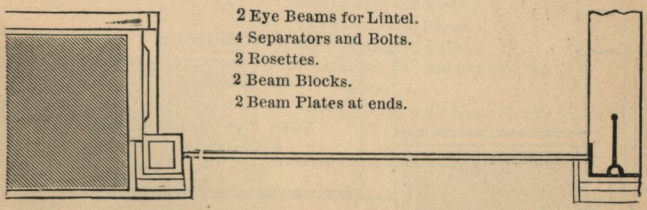
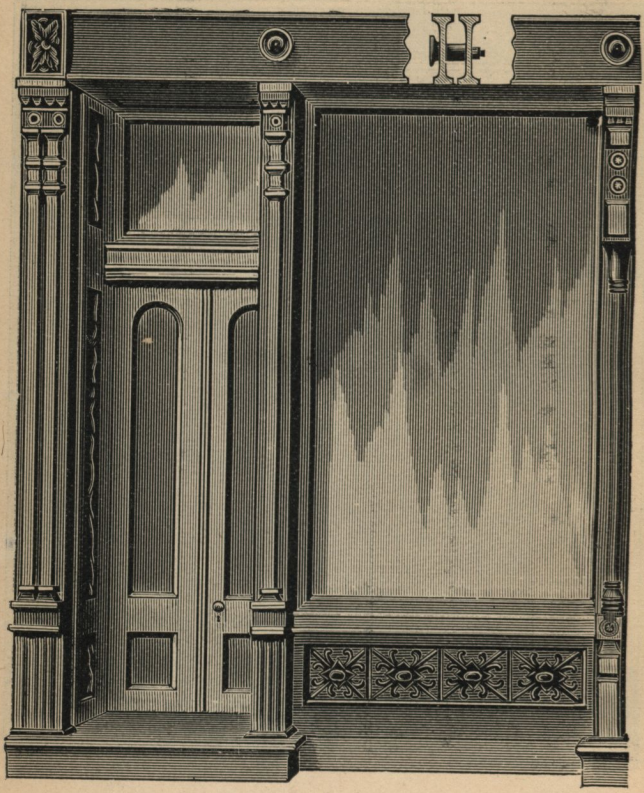


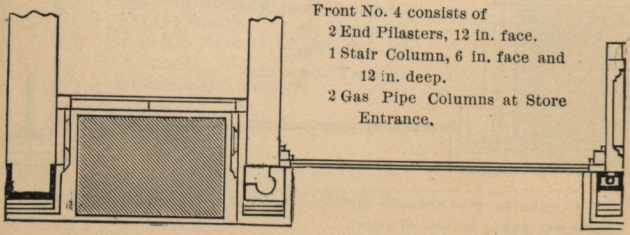


2 Eye Beams for Lintel.
4 Separators and Bolts.
2 Rosettes.
2 Beam Blocks.
2 Beam Plates at ends.

In ordering, give distance between centers of columns, and also from stone pier cap to bottom of lintel.

Give number of stories to be carried.



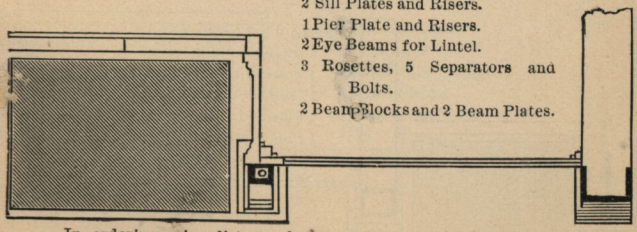


Front No. 4 consists of
2 End Pilasters, 12 in. face.
1 Stair Column, 6 in. face and 12 in. deep.
2 Gas Pipe Columns at Store Entrance.

Store Front No. 4.

BOUTON · FOUNDRY · COMPANY,

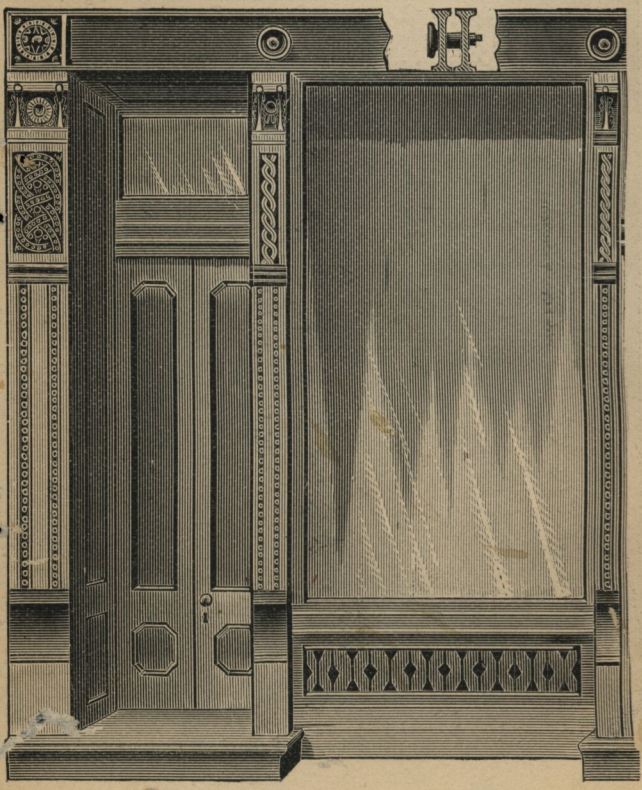
2600 Archer Avenue, Chicago.

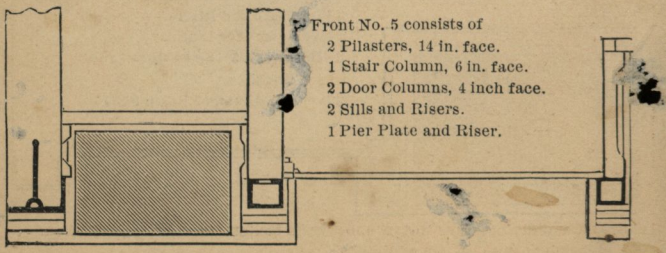


2 Sill Plates and Risers.
1 Pier Plate and Risers.
2 Eye Beams for Lintel.
3 Rosettes, 5 Separators and Bolts.
2 Beam Blocks and 2 Beam Plates.

In ordering, give distance between centers of columns, and from stone pier cap to bottom of lintel.

Give number of stories to be carried.



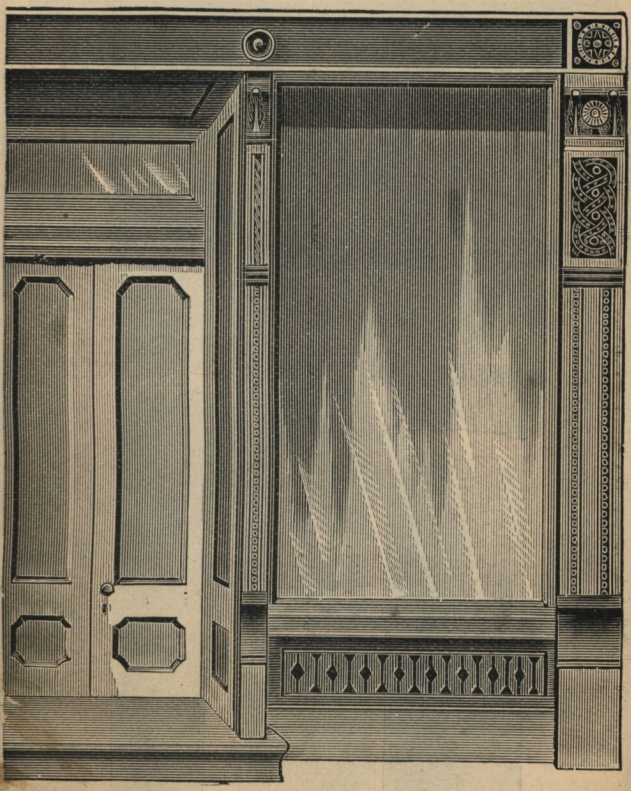


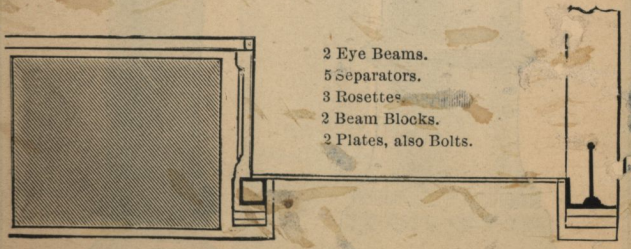
Front No. 5 consists of
2 Pilasters, 14 in. face.
1 Stair Column, 6 in. face.
2 Door Columns, 4 inch face.
2 Sills and Risers.
1 Pier Plate and Riser.

Store Front No. 5.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.





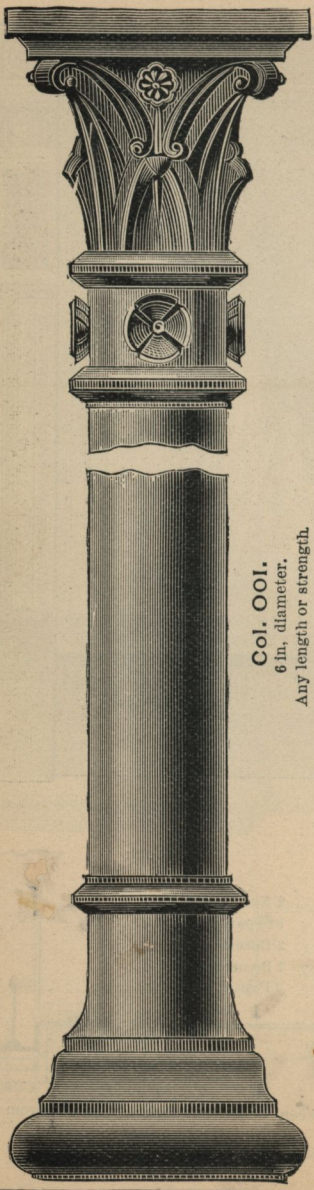
2 Eye Beams.
5 Separators.
3 Rosettes.
2 Beam Blocks.
2 Plates, also Bolts.

In ordering, give distance between centers of columns, and also from stone pier cap to bottom of lintel.

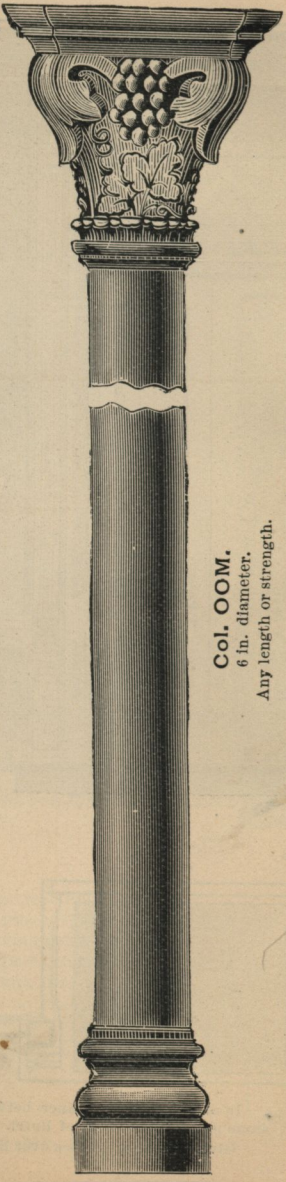
Give number of stories over lintel.

BOUTON · FOUNDRY · COMPANY,

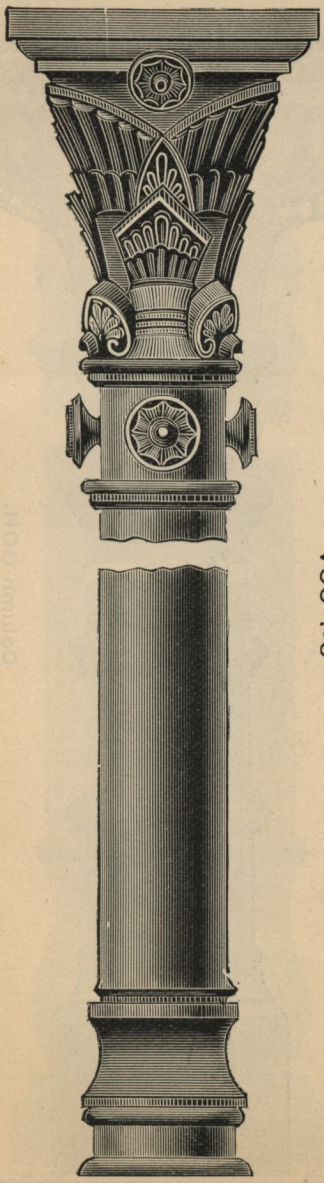
2600 Archer Avenue, Chicago.



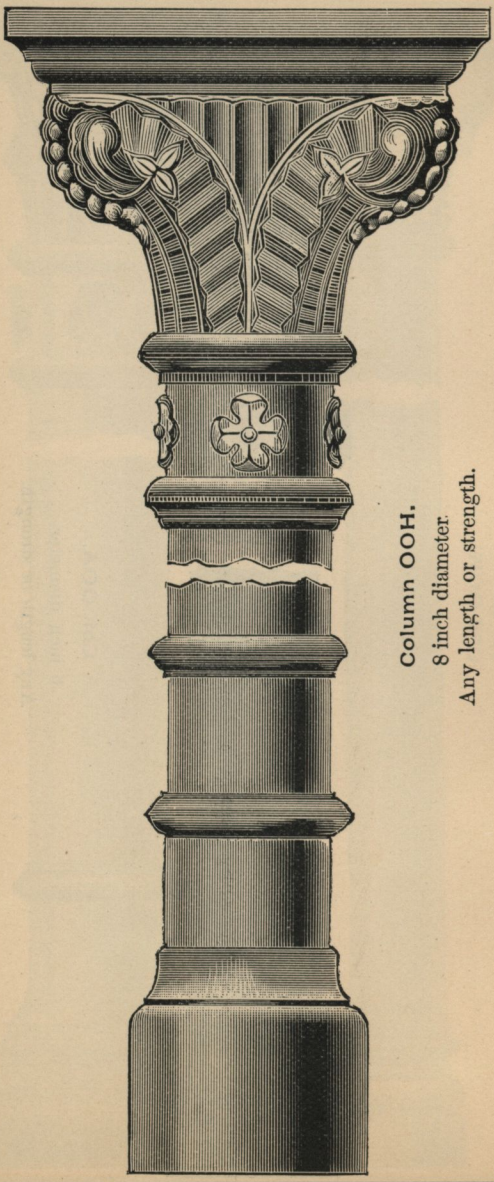
Col. OOI.
6 in. diameter.
Any length or strength.



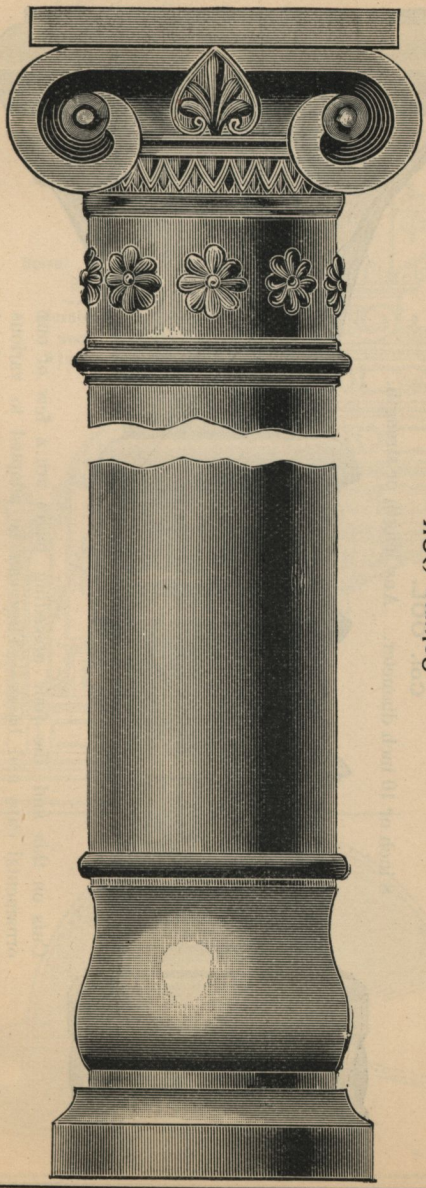
Col. OOM.
6 in. diameter.
Any length or strength.



Col. OOA.
6 inch diameter.
Any length or strength.



Column OOH.
8 inch diameter.
Any length or strength.



Column OOK.
10 inch or 12 inch diameter.
Any length or strength

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

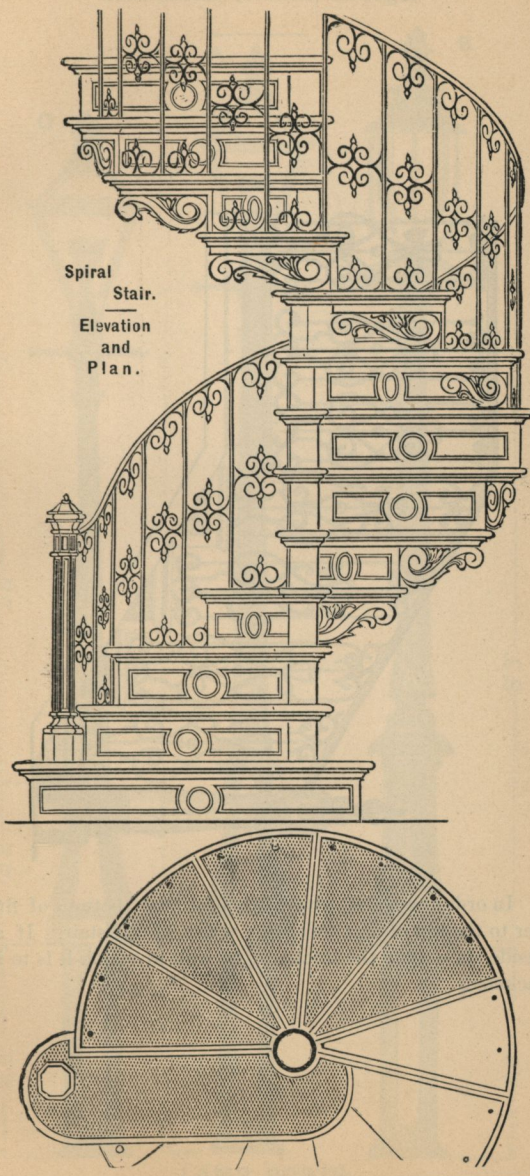
Col. OOL.

8 inch or 10 inch diameter. Any length or strength.

Cuts on this and the four preceding pages are a few of our ornamental caps and bases. They can be adapted to various shafts as desired. The mouldings can be changed or omitted entirely. We have many other styles and will be glad to send blue prints for special designs, on application.

BOUTON · FOUNDRY · COMPANY,

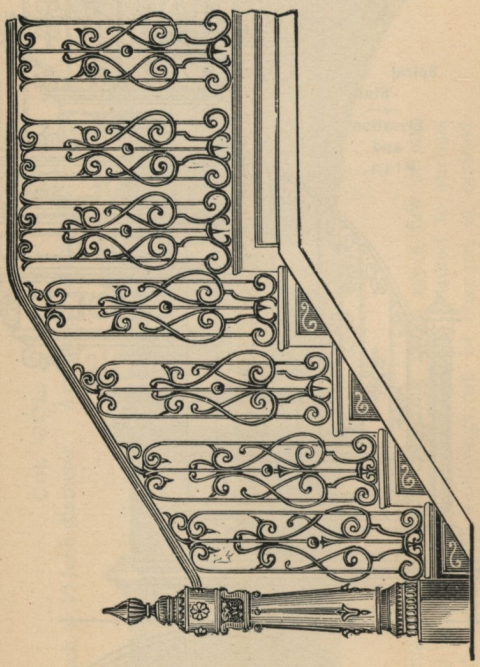
2600 Archer Avenue, Chicago.



Spiral Stair.

Elevation and Plan.

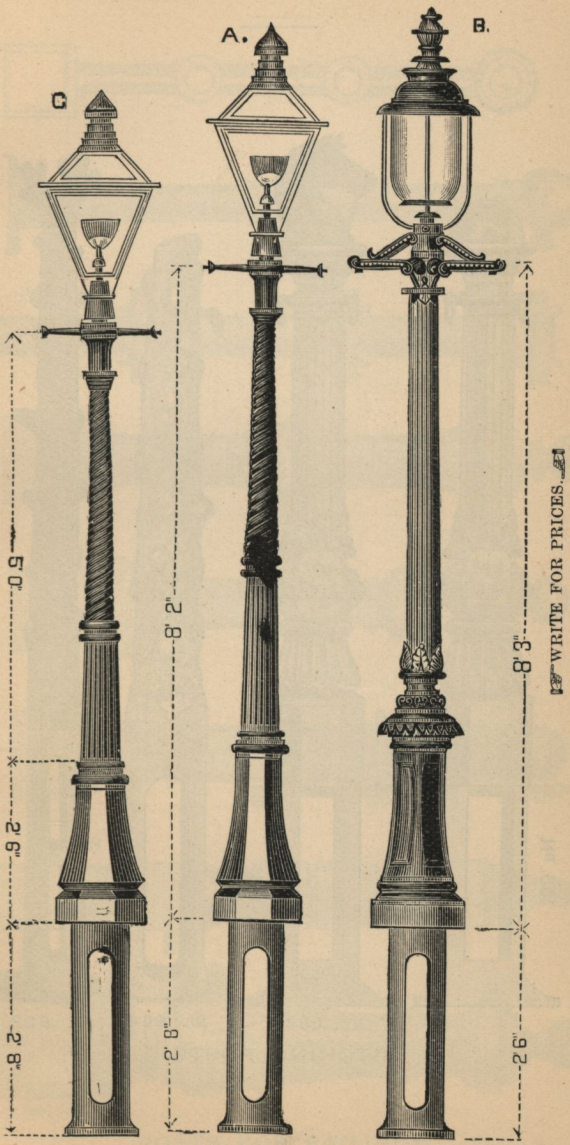
We make a specialty of Fine Stair Work of all kinds.



In ordering stairs, give the height from bottom of first riser to the top of last tread, the width of the stair. If an outside stair, state the thickness of wall to which it is to be bracketed.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



☞ WRITE FOR PRICES. ☜

LAMP POSTS.

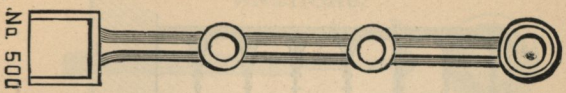
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

HITCHING POSTS.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.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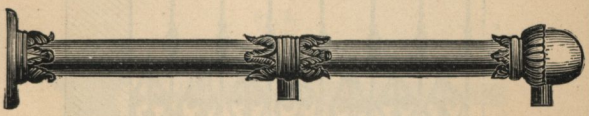
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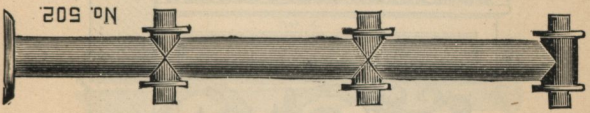
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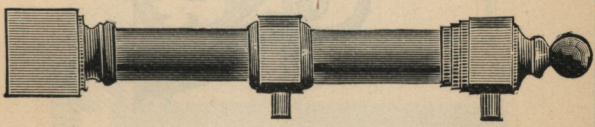
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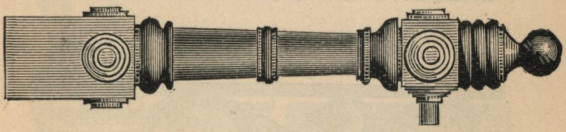
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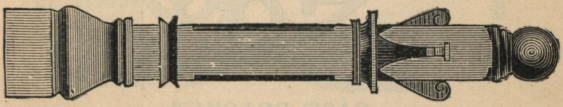
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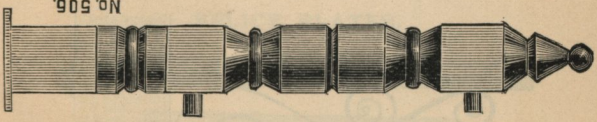
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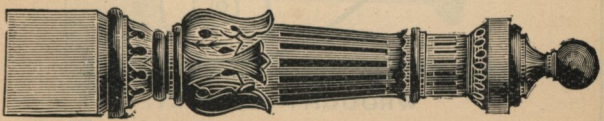
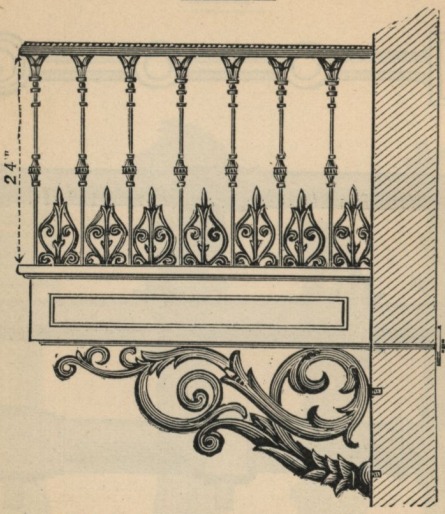

No. 507.

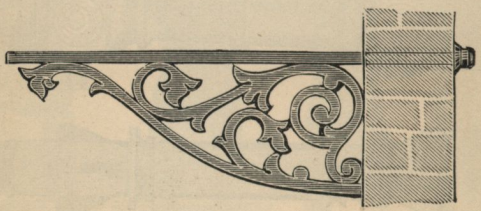
POSTS FOR RAILINGS.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



BALCONY BRACKET AND RAILING.



CAST BRACKET.

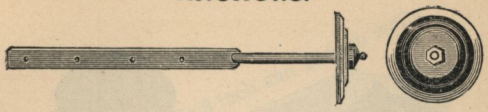
WROUGHT BRACKET.

In ordering, give projection, thickness of wall and weight to be carried.

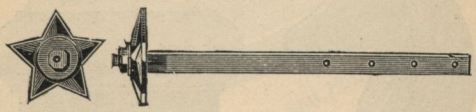
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

ANCHORS.

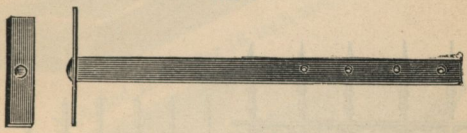


No. 1.



No. 2.

No. 3.



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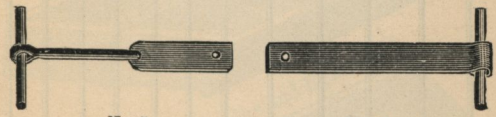
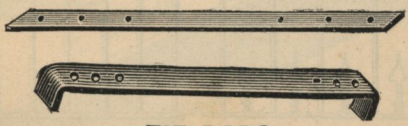


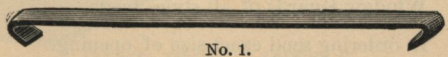
No. 5. No. 6.

No. 7.

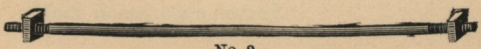
SPLICE PLATES.



TIE RODS.



No. 1.

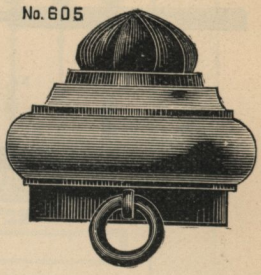


No. 2.

BOUTON · FOUNDRY · COMPANY,

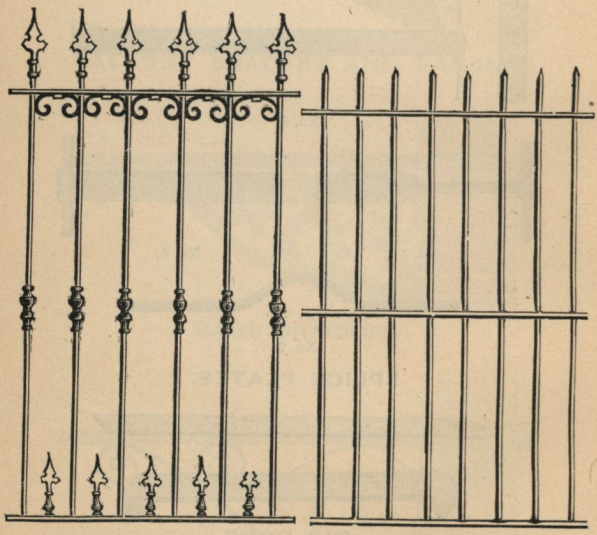
2600 Archer Avenue, Chicago.

No. 606



No. 605

CAPS FOR WOODEN POSTS.

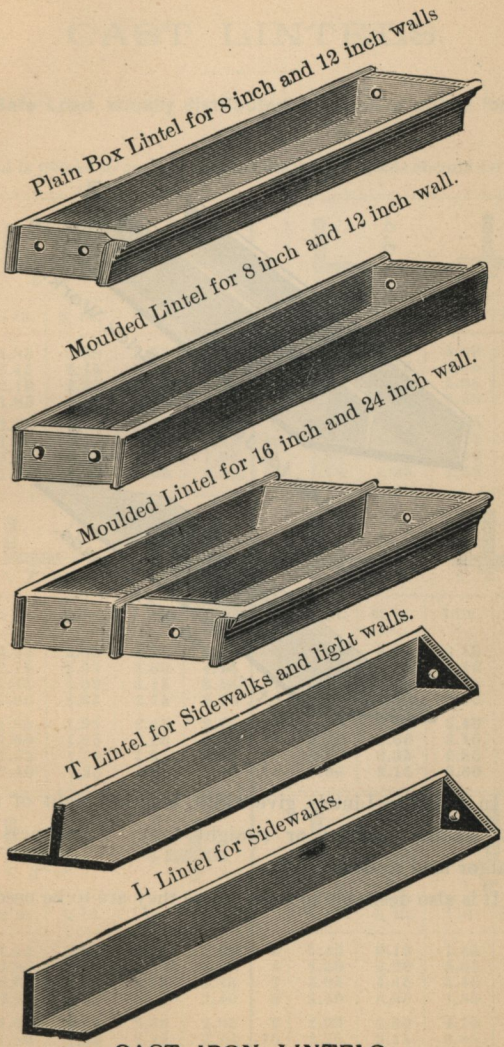


Window Guards of all styles made.

In ordering send exact size of opening.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

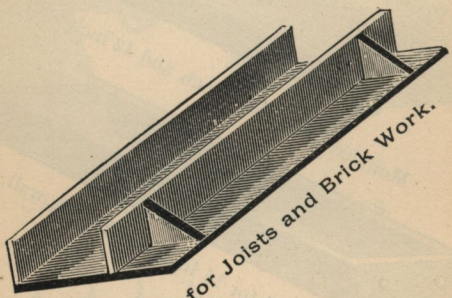

Plain Box Lintel for 8 inch and 12 inch walls
Moulded Lintel for 8 inch and 12 inch wall.
Moulded Lintel for 16 inch and 24 inch wall.
T Lintel for Sidewalks and light walls.
L Lintel for Sidewalks.

CAST IRON LINTELS.

Made in any style desired.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



Lintels for Joists and Brick Work.

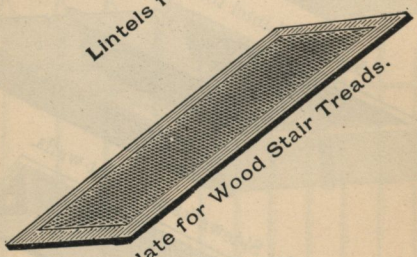


Plate for Wood Stair Treads.

In ordering Lintels, give width, length, height of ribs (state whether arched or straight top). Thickness of metal (or load to be carried).

It is also desirable to state where they are to be used.

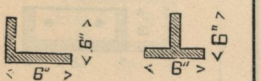
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

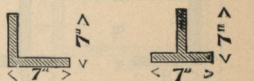
CAST LINTELS.

Safe Load, equally distributed, in Tons of 2,000 lbs.

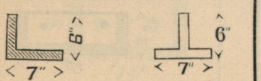
If load is placed in centre, only one-half these loads should be used.



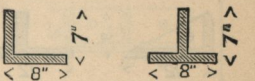
	⅝ in.	¾ in.	1 in.	1¼ in.
5	2.85	3.28	3.95	4.45
6	2.45	2.75	3.27	3.65
7	2.10	2.30	2.85	3.15
8	1.85	2.00	2.45	2.75
9	1.65	1.85	2.20	2.45
10	1.50	1.70	1.95	2.25
11	1.35	1.55	1.80	1.95
12	1.26	1.48	1.65	1.80



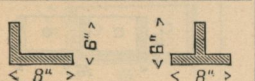
	⅝ in.	¾ in.	1 in.	1¼ in.
5	3.96	4.60	5.60	6.35
6	3.40	3.85	4.65	5.30
7	2.95	3.35	3.95	4.55
8	2.55	2.90	3.55	3.95
9	2.35	2.60	3.15	3.55
10	1.98	2.35	2.75	3.20
11	1.85	2.15	2.60	2.95
12	1.70	1.95	2.35	2.75



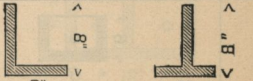
	⅝ in.	¾ in.	1 in.	1¼ in.
5	3.25	3.65	4.35	4.90
6	2.70	2.97	3.65	4.15
7	2.35	2.69	3.15	3.58
8	1.96	2.35	2.75	3.10
9	1.85	1.98	2.45	2.75
10	1.60	1.85	2.20	2.50
11	1.55	1.70	1.95	2.25
12	1.40	1.55	1.80	2.10



	⅝ in.	¾ in.	1 in.	1¼ in.
5	4.55	5.10	6.15	6.96
6	3.75	4.25	5.10	5.90
7	3.20	3.65	4.45	4.99
8	2.85	3.22	3.85	4.45
9	2.50	2.85	3.40	3.95
10	2.35	2.60	3.15	3.50
11	1.99	2.35	2.85	3.25
12	1.95	2.15	2.60	2.90



	⅝ in.	¾ in.	1 in.	1¼ in.
5	3.55	3.93	4.75	5.35
6	2.95	3.35	3.95	4.50
7	2.60	2.95	3.45	3.85
8	2.25	2.50	2.98	3.40
9	1.95	2.25	2.60	2.95
10	1.80	1.96	2.45	2.75
11	1.75	1.80	2.20	2.50
12	1.50	1.75	1.95	2.25



	⅝ in.	¾ in.	1 in.	1¼ in.
5	5.45	6.15	7.65	8.70
6	4.50	5.20	6.35	7.35
7	3.95	4.45	5.40	6.30
8	3.40	3.95	4.85	5.55
9	2.99	3.50	4.25	4.95
10	2.75	3.15	3.85	4.40
11	2.50	2.85	3.50	3.95
12	2.35	2.65	3.25	3.70

Factor of Safety, 8.

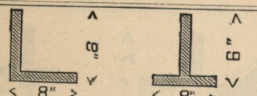
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

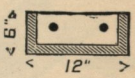
CAST LINTELS.

Safe Load, equally distributed, in Tons of 2,000 lbs.

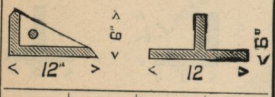
If load is placed in centre, only one-half these loads should be used.



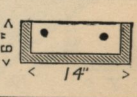
	⅝ in.	¾ in.	1 in.	1¼ in.
5	6.45	7.45	9.10	10.65
6	5.35	6.15	7.65	8.85
7	4.60	5.30	6.50	7.65
8	3.95	4.60	5.55	6.65
9	3.60	4.15	5.15	5.95
10	3.25	3.75	4.65	5.35
11	2.95	3.40	4.25	4.80
12	2.75	3.15	3.85	4.45



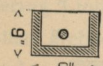
	⅝ in.	¾ in.	1 in.	1¼ in.
5	5.75	6.45	7.65	8.70
6	4.80	5.35	6.35	7.35
7	4.15	4.65	5.40	6.25
8	3.65	3.97	4.75	5.45
9	3.25	3.65	4.25	4.95
10	2.95	3.25	3.85	4.40
11	2.70	2.95	3.50	3.99
12	2.45	2.70	3.25	3.65



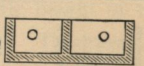
	⅝ in.	¾ in.	1 in.	1¼ in.
5	4.85	5.40	6.45	6.96
6	3.95	4.56	5.35	5.95
7	3.50	3.85	4.60	4.97
8	2.96	3.42	3.95	4.45
9	2.75	2.98	3.60	3.95
10	2.48	2.75	3.25	3.55
11	2.25	2.50	2.90	3.25
12	1.98	2.35	2.75	2.90



	⅝ in.	¾ in.	1 in.	1¼ in.
5	6.35	7.20	8.50	9.70
6	5.35	5.92	7.10	8.10
7	4.55	5.15	6.15	6.95
8	3.92	4.45	5.35	6.15
9	3.59	3.95	4.75	5.45
10	3.25	3.45	4.30	4.90
11	2.95	3.30	3.95	4.45
12	2.70	2.96	3.65	4.10



	⅝ in.	¾ in.	1 in.	1¼ in.
5	4.31	4.75	5.75	6.55
6	3.65	3.90	4.85	5.45
7	3.15	3.45	4.15	4.70
8	2.75	2.97	3.65	4.15
9	2.45	2.70	3.15	3.65
10	2.20	2.45	2.95	3.35
11	1.93	2.25	2.65	2.92
12	1.85	1.95	2.40	2.75



	⅝ in.	¾ in.	1 in.	1¼ in.
5	6.95	7.90	9 45	10.65
6	5.85	6.65	7.90	8.90
7	4.95	5.65	6.75	7.65
8	4.40	4.95	5.95	6.70
9	3.95	4.45	5.30	5.95
10	3.55	3.91	4.75	5.38
11	3.25	3.65	4.35	4.95
12	2.95	3.30	3.90	4.65

Factor of Safety, 8.

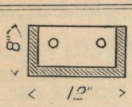
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

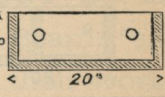
CAST LINTELS.

Safe Load, equally distributed, in Tons of 2,000 lbs.

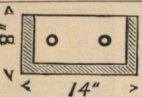
If load is placed in centre, only one-half these loads should be used.



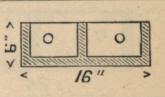
	⅝ in.	¾ in.	1 in.	1¼ in.
5	8.65	9.90	12.25	13.98
6	7.30	8.35	10.25	11.75
7	6.25	7.15	8.80	9.99
8	5.45	6.25	7.75	8.85
9	4.88	5.60	6.85	7.80
10	4.45	4.95	6.15	6.99
11	3.91	4.65	5.65	6.45
12	3.65	4.25	5.20	5.95



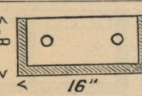
	⅝ in.	¾ in.	1 in.	1¼ in.
5	12.75	14.65	17.85	19.95
6	10.65	12.25	14.95	16.60
7	9.15	10.45	12.70	14.25
8	7.90	9.15	11.25	12.50
9	7.15	8.20	9.95	11.15
10	6.45	7.35	8.99	9.90
11	5.85	6.70	8.25	9.10
12	5.35	6.15	7.55	8.35



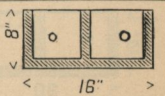
	⅝ in.	¾ in.	1 in.	1¼ in.
5	9.75	11.20	13.75	15.85
6	8.15	9.35	11.45	13.25
7	6.99	7.92	9.85	11.30
8	6.15	6.93	8.60	9.95
9	5.45	6.26	7.67	8.88
10	4.95	5.65	6.90	7.95
11	4.40	5.14	6.25	7.25
12	4.12	4.75	5.75	6.65



	¾ in.	1 in.	1¼ in.	1½ in.
5	8.75	10.55	11.95	12.95
6	7.35	8.95	9.99	10.90
7	6.30	7.60	8.55	9.35
8	5.55	6.65	7.50	8.15
9	4.95	5.95	6.65	7.30
10	4.45	5.35	5.93	6.55
11	3.94	4.85	5.50	5.65
12	3.70	4.40	4.94	5.50



	⅝ in.	¾ in.	1 in.	1¼ in.
5	10.75	12.35	14.93	17.45
6	8.95	10.35	12.55	14.60
7	7.70	8.85	10.75	12.50
8	6.75	7.75	9.45	10.95
9	5.92	6.90	8.35	9.75
10	5.45	6.20	7.55	8.78
11	4.95	5.69	6.85	7.99
12	4.60	5.15	6.30	7.35



	¾ in.	1 in.	1¼ in.	1½ in.
5	13.75	16.85	19.55	21.70
6	11.45	13.98	16.30	18.15
7	9.80	11.99	13.90	15.55
8	8.65	10.60	12.20	13.60
9	7.65	9.45	10.85	12.00
10	6.90	8.50	9.80	10.90
11	6.30	7.75	8.35	9.95
12	5.75	6.99	8.15	9.10

Factor of Safety, 8.

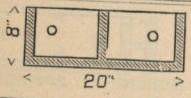
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

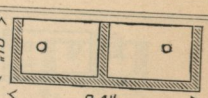
CAST LINTELS.

Safe Load, equally distributed, in Tons of 2,000 lbs.

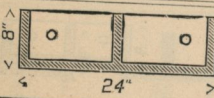
If load is placed in centre, only one-half these loads should be used.



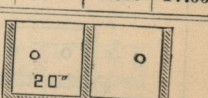
	¾ in.	1 in.	1¼ in.	1½ in.
5	16.25	19.85	22.85	25.50
6	13.45	16.55	18.98	21.30
7	11.55	14.20	16.40	18.25
8	10.12	12.45	14.35	15.85
9	8.91	10.97	12.75	14.20
10	8.15	9.95	11.50	12.75
11	7.35	8.97	10.45	11.60
12	6.78	8.35	9.60	10.65



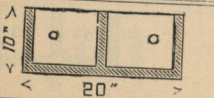
	¾ in.	1 in.	1¼ in.	1½ in.
5	25.65	31.90	36.85	42.19
6	21.40	26.65	30.70	35.17
7	18.45	22.97	26.35	30.16
8	15.98	19.94	22.95	26.40
9	14.30	17.85	20.50	23.45
10	12.78	15.95	18.45	21.25
11	11.70	14.60	16.75	19.25
12	10.75	13.40	15.40	17.65



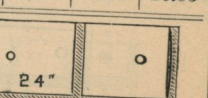
	¾ in.	1 in.	1¼ in.	1½ in.
5	18.50	22.65	26.15	29.00
6	15.45	18.90	21.80	24.25
7	13.25	16.25	18.75	20.70
8	11.55	14.15	16.35	18.00
9	10.35	12.65	14.55	16.00
10	9.25	11.40	13.12	14.50
11	8.45	10.35	11.95	13.00
12	7.80	9.55	10.95	12.00



	¾ in.	1 in.	1¼ in.	1½ in.
5	29.45	36.90	43.80	49.85
6	24.55	30.90	36.55	41.55
7	20.96	26.45	31.35	35.66
8	18.40	23.25	27.45	31.22
9	16.40	20.45	24.40	27.75
10	14.75	18.55	21.99	24.99
11	13.45	16.90	19.95	22.75
12	12.35	15.50	18.35	20.85



	¾ in.	1 in.	1¼ in.	1½ in.
5	22.50	27.94	32.75	37.10
6	18.75	23.38	27.35	30.95
7	16.10	19.96	23.45	26.54
8	14.15	17.55	20.50	23.35
9	12.55	15.65	18.25	20.65
10	11.35	13.97	16.45	18.65
11	10.25	12.80	14.90	16.90
12	9.60	11.75	13.75	15.55



	¾ in.	1 in.	1¼ in.	1½ in.
5	33.45	41.95	49.65	56.75
6	27.85	34.99	41.35	47.30
7	23.90	29.90	35.45	40.55
8	20.95	26.25	30.96	35.45
9	18.60	23.35	27.65	31.56
10	16.75	20.93	24.85	28.40
11	15.30	19.12	22.65	25.80
12	13.99	17.50	20.75	23.70

Factor of Safety, 8.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

STEEL I BEAMS

THE BOUTON FOUNDRY CO. are large dealers in Steel Beams, and carry a stock of same at their works, No. 2600 Archer Avenue, which we offer for sale at slightly advanced prices over those ordered through us from the mill.

Dealing so largely in these beams we are able to make quicker deliveries than some smaller dealers.

Our prices will always be found satisfactory.

Send for estimates.

Correspondence solicited.

CARNEGIE STEEL BEAMS.

ON the following page we give cuts of sections of STEEL BEAMS, after which are tables with the number, weight and dimensions of each section as rolled by Carnegie Bros.

Following this table we give the SAFE LOADS, and then tables of the proper spaces for loads of 100, 125, 150, 175, 200, 250, 300 and 350 lbs. per square foot.

Following tables for Steel Beams we give tables of IRON BEAMS.

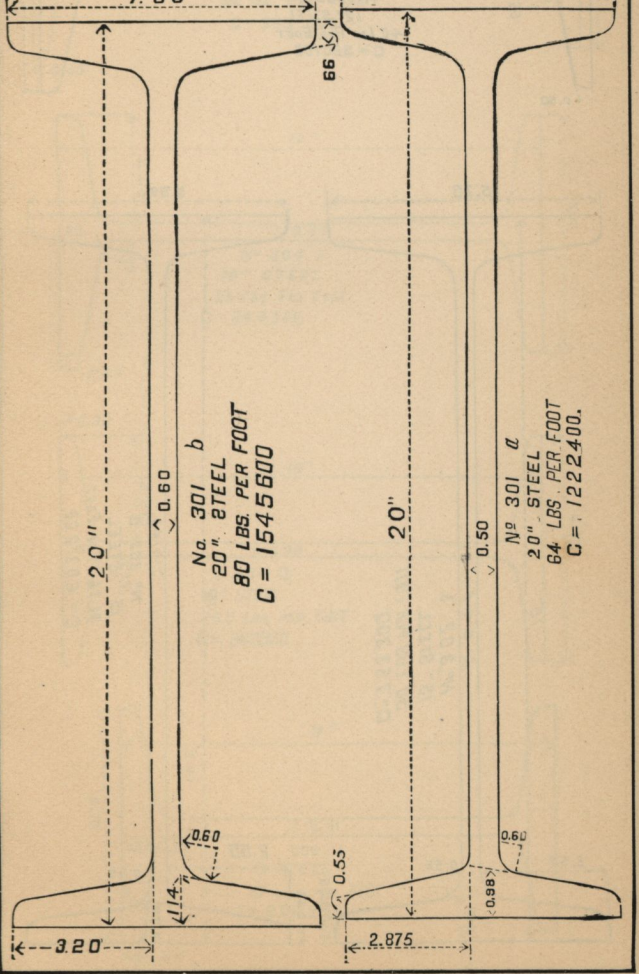
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

CARNEGIE

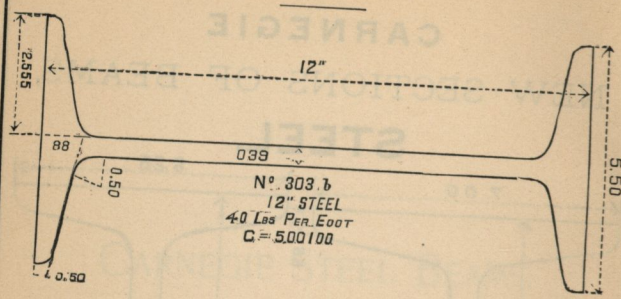
NEW SECTIONS OF BEAMS,

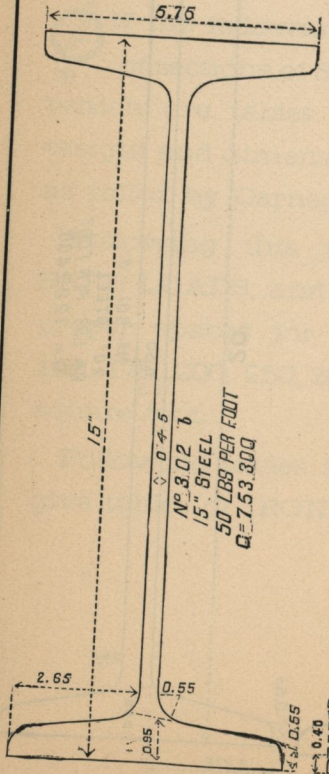
STEEL.

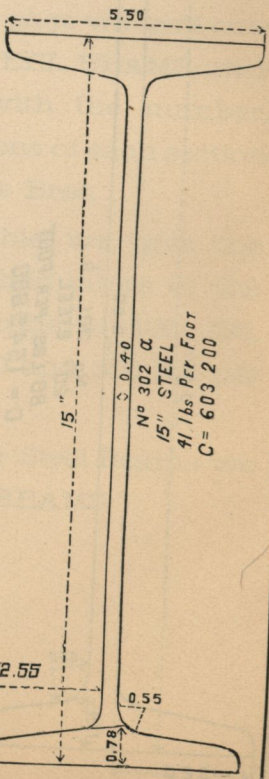


BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

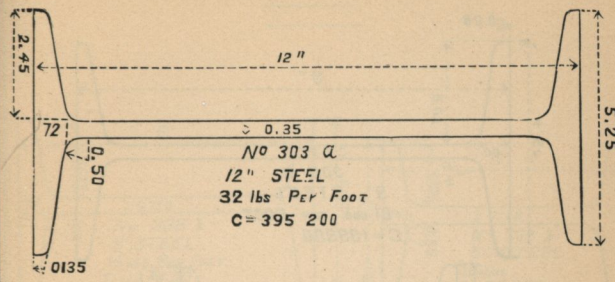




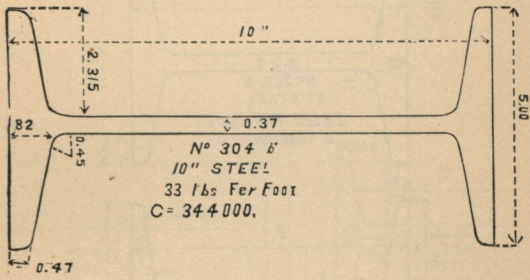


BOUTON · FOUNDRY · COMPANY,

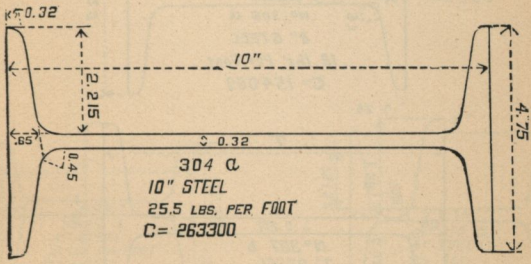
2600 Archer Avenue, Chicago.



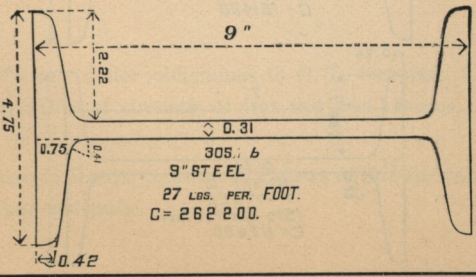
Nº 303 a
12" STEEL
32 lbs PER FOOT
C= 395 200



Nº 304 b
10" STEEL
33 lbs PER FOOT
C= 344000.



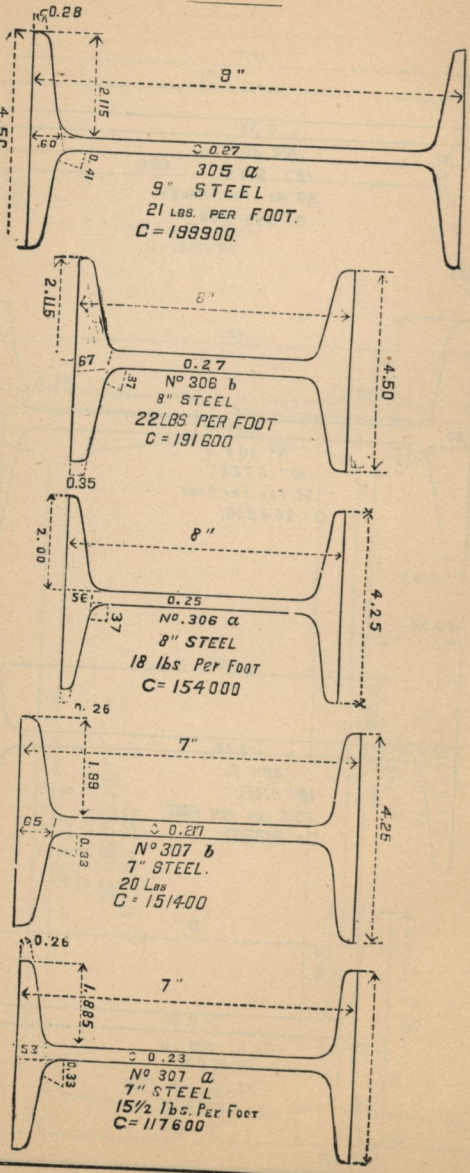
304 a
10" STEEL
25.5 LBS. PER FOOT
C= 263300



305 b
9" STEEL
27 LBS. PER FOOT.
C= 262 200.

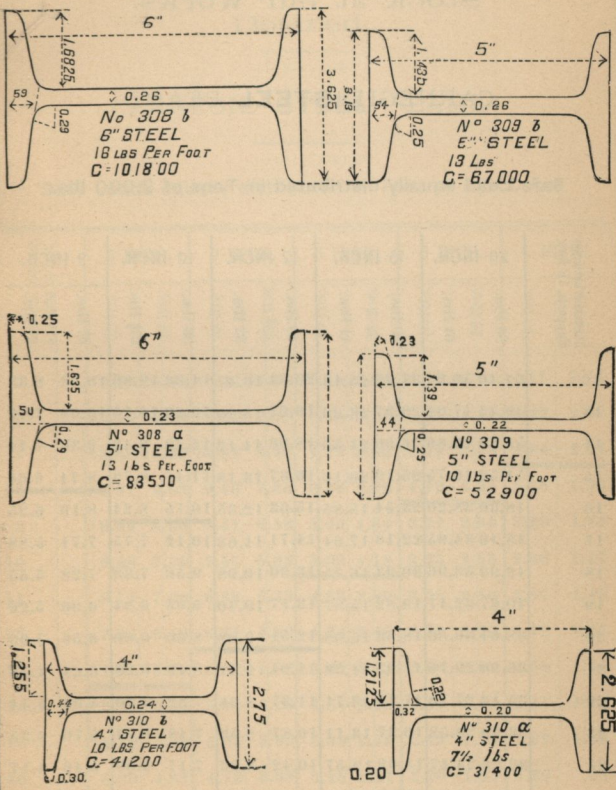
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



We are under obligations to C. L. STROBEL, C. E., for the tables of strength, of iron and steel I beams.

Also to Messrs. CARNEGIE, PHIPPS & Co., for valuable cuts and assistance.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We carry Steel and Iron Beams in Stock at our Works.

CARNEGIE **STEEL** BEAMS.

Safe Load equally distributed in Tons of 2,000 lbs.

Distance between Supports, in feet.	20 INCH.		15 INCH.		12 INCH.		10 INCH.		9 INCH.	
	80 lbs.	64 lbs.	50 lbs.	41 lbs.	40 lbs.	32 lbs.	33 lbs.	25½ lbs.	27 lbs.	21 lbs.
12	64.40	50.93	31.39	25.13	20.84	16.47	14.33	10.99	10.92	8.33
13	59.45	47.01	28.97	23.20	19.24	15.20	13.23	10.15	10.08	7.69
14	55.20	43.66	26.90	21.50	18.86	14.12	12.29	9.42	9.36	7.14
15	51.52	40.75	25.10	20.10	16.67	13.18	11.47	8.79	8.74	6.66
16	48.30	38.20	23.54	18.85	15.63	12.35	10.75	8.24	8.19	6.25
17	45.46	35.95	22.16	17.64	14.71	11.63	10.12	7.75	7.71	5.88
18	42.93	33.96	20.93	16.75	13.90	10.98	9.56	7.33	7.28	5.55
19	40.67	32.17	19.82	15.87	13.17	10.40	9.05	6.94	6.90	5.26
20	38.64	30.56	18.83	15.08	12.51	9.88	8.60	6.60	6.56	5.00
21	36.80	29.10	17.93	14.36	11.91	9.41	8.19	6.28	6.24	4.76
22	35.13	27.78	17.12	13.71	11.37	8.98	7.82	6.00	5.96	4.54
23	33.60	26.58	16.37	13.11	10.87	8.59	7.48	5.74	5.70	4.35
24	32.20	25.47	15.69	12.57	10.42	8.23	7.17	5.50	5.46	4.17
25	30.91	24.45	15.06	12.06	10.01	7.90	6.88	5.28	5.24	4.00
26	29.72	23.51	14.48	11.60	9.62	7.60	6.62	5.07	5.04	3.84
27	28.62	22.64	13.95	11.17	9.26	7.32	6.37	4.89	4.86	3.70
28	27.60	21.83	13.45	10.79	8.93	7.06	6.14	4.71	4.68	3.57
29	26.65	21.08	12.98	10.40	8.62	6.32	5.93	4.55	4.52	3.45
30	25.76	20.37	12.55	10.05	8.34	6.59	5.73	4.40	4.37	3.33

Safe loads given include weight of beam. Maximum fibre strain 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Estimates Given on Beams (Steel or Iron) in Quantities as Desired.

CARNEGIE **STEEL** BEAMS.

Safe Loads equally distributed in Tons of 2,000 lbs.

Distance between Supports in feet.	8 INCH.		7 INCH.		6 INCH.		5 INCH.		4 INCH.	
	22½ lbs.	18 lbs.	20 lbs.	15½ lbs.	16 lbs.	13 lbs.	13 lbs.	10 lbs.	10 lbs.	7½ lbs.
5	19.16	15.40	15.14	11.76	10.18	8.35	6.70	5.29	4.12	3.14
6	15.97	12.83	12.62	9.80	8.48	6.96	5.58	4.41	3.43	2.62
7	13.69	11.00	10.81	8.40	7.27	5.96	4.79	3.78	2.94	2.24
8	11.97	9.63	9.46	7.35	6.36	5.22	4.19	3.31	2.58	1.96
9	10.64	8.56	8.41	6.53	5.66	4.64	3.72	2.94	3.29	1.74
10	9.58	7.70	7.57	5.88	5.09	4.18	3.35	2.65	2.06	1.57
11	8.71	7.00	6.88	5.35	4.63	3.80	3.05	2.40	1.87	1.43
12	7.98	6.42	6.31	4.90	4.24	3.48	2.79	2.20	1.72	1.31
13	7.37	5.92	5.82	4.52	3.92	3.21	2.58	2.03	1.58	1.21
14	6.84	5.50	5.41	4.20	3.64	2.98	2.39	1.89	1.47	1.12
15	6.39	5.13	5.05	3.92	3.39	2.78	2.23	1.76	1.37	1.05
16	5.99	4.81	4.73	3.68	3.18	2.61	2.09	1.65	1.29	.98
17	5.64	4.53	4.45	3.46	2.99	2.46	1.97	1.56	1.21	.92
18	5.32	4.28	4.21	3.27	2.83	2.32	1.86	1.47	1.14	.87
19	5.04	4.05	3.98	3.09	2.68	2.20	1.76	1.39	1.08	.83
20	4.79	3.85	3.79	2.94	2.55	2.09	1.68	1.32	1.03	.79
21	4.56	3.67	3.60	2.80	2.42	1.99	1.60	1.26	.98	.75

Safe loads given include weight of beam. Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Estimates made on Plate and Box Girders.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 100 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

Distance between Supports, in feet.	20 INCH.		15 INCH.		12 INCH.		10 INCH.		9 INCH.	
	80 lbs.	64 lbs.	50 lbs.	41 lbs.	40 lbs.	32 lbs.	33 lbs.	25½ lbs.	27 lbs.	21 lbs.
12.....	107.3	84.9	52.3	41.9	34.7	27.4	23.9	18.3	18.2	13.9
13.....	91.5	72.3	44.6	35.7	29.6	23.4	20.4	15.6	15.5	11.8
14.....	78.8	62.4	38.4	30.8	25.5	20.2	17.6	13.5	13.4	10.2
15.....	68.7	54.3	33.5	26.8	22.2	17.6	15.3	11.7	11.7	8.9
16.....	60.4	47.7	29.4	23.6	19.5	15.4	13.4	10.3	10.2	7.8
17.....	53.5	42.3	26.1	20.9	17.3	13.7	11.9	9.1	9.1	6.9
18.....	47.7	37.7	23.3	18.6	15.4	12.2	10.6	8.1	8.9	6.2
19.....	42.8	33.9	20.9	16.7	13.9	10.9	9.5	7.3	7.3	5.5
20.....	38.6	30.6	18.8	15.1	12.5	9.9	8.6	6.6	6.6	5.0
21.....	35.0	27.7	17.1	13.7	11.3	8.9	7.8	6.0	5.9	4.5
22.....	31.9	25.3	15.6	12.5	10.3	8.2	7.1	5.5	5.5	4.1
23.....	29.2	23.1	14.2	11.4	9.5	7.5	6.5	5.0	5.0	3.8
24.....	26.8	21.2	13.1	10.5	8.7	6.9	6.0	4.6	4.6	3.5
25.....	24.7	19.6	12.1	9.6	8.0	6.3	5.5	4.2	4.2	3.2
26.....	22.9	18.1	11.1	8.9	7.4	5.8	5.1	3.9	3.9	3.0
27.....	21.2	16.8	10.3	8.3	6.9	5.4	4.7	3.6	3.6	2.7
28.....	19.7	15.6	9.6	7.7	6.4	5.0	4.4	3.4	3.4	2.6
29.....	18.4	14.5	9.0	7.2	5.9	4.7	4.1	3.1	3.1	2.4
30.....	17.2	13.6	8.4	6.7	5.6	4.4	3.8	2.9	2.9	2.2

For load of 200 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We have special facilities for casting extra heavy columns and other work.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 100 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

Distance between Supports in feet.	8 INCH.		7 INCH.		6 INCH.		5 INCH.		4 INCH.	
	22 lbs.	18 lbs.	20 lbs.	15½ lbs.	16 lbs.	13 lbs.	13 lbs.	10 lbs.	10 lbs.	7½ lbs.
5	76.6	61.6	60.6	47.0	40.7	33,4	26.8	21.2	16.5	12.6
6	53.2	42.8	42.1	32.7	28.3	23.2	18.6	14.7	11.4	8.7
7	39.1	31.4	30.9	24.0	20.8	17.0	13.7	10.8	8.4	6.4
8	29.9	24.1	23.7	18.4	15.9	13.0	10.5	8.3	6.4	4.9
9	23.7	19.0	18.7	14.5	12.6	10.3	8.3	6.5	5.1	3.9
10	19.2	15.4	15.1	11.8	10.2	8.4	6.7	5.3	4.1	3.1
11	15.8	12.7	12.5	9.7	8.4	6.9	5.5	4.4	3.4	2.6
12	13.3	10.7	10.5	8.2	7.1	5.8	4.7	3.7	2.9	2.2
13	11.3	9.1	9.0	7.0	6.0	4.9	4.0	3.1	2.4	1.9
14	9.8	7.9	7.7	6.0	5.2	4.3	3.4	2.7	2.1	1.6
15	8.5	6.8	6.7	5.2	4.5	3.7	3.0	2.3	1.8	1.4
16	7.5	6.0	5.9	4.6	4.0	3.3	2.6	2.1	1.6	1.2
17	6.6	5.3	5.2	4.1	3.5	2.9	2.3	1.8	1.4	1.1
18	5.9	4.8	4.7	3.6	3.1	2.6	2.1	1.6	1.3	1.0
19	5.3	4.3	4.2	3.3	2.8	2.3	1.9	1 5	1.1	.....
20	4.8	3.9	3.8	2.9	2.5	2.1	1.7	1.3	1.0	.....
21	4.3	3.5	3.4	2.7	2.3	1.9	1.5	1.2	.....	.....
22	4.0	3.2	3.1	2.4	2.1	1.7	1.4	1.1	.....	.....

For load of 200 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We make large Kettles, Cylinders, and all kinds of dry sand and loam work.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 125 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

Distance between Supports, in feet.	20 INCH.		15 INCH.		12 INCH.		10 INCH.		9 INCH.	
	80 lbs.	64 lbs.	50 lbs.	41 lbs.	40 lbs.	32 lbs.	33 lbs.	25½ lbs.	27 lbs.	21 lbs.
12.....	85.9	67.9	41.8	33.5	27.8	21.9	19.1	14.6	14.6	11.1
13.....	73.2	57.8	35.7	28.6	23.7	18.7	16.3	12.5	12.4	9.5
14.....	63.1	49.9	30.7	24.6	20.4	16.2	14.1	10.8	10.7	8.2
15.....	55.0	43.5	26.8	21.4	17.8	14.1	12.2	9.4	9.3	7.1
16.....	48.3	38.2	23.5	18.9	15.6	12.3	10.7	8.2	8.2	6.2
17.....	42.8	33.8	20.9	16.7	13.8	11.0	9.5	7.3	7.3	5.5
18.....	38.2	30.2	18.6	14.9	12.3	9.8	8.5	6.5	6.5	4.9
19.....	34.2	27.1	16.7	13.4	11.1	8.7	7.6	5.8	5.8	4.4
20.....	30.9	24.5	15.0	12.1	10.0	7.9	6.9	5.3	5.2	4.0
21.....	28.0	22.2	13.7	11.0	9.0	7.1	6.2	4.8	4.8	3.6
22.....	25.5	20.2	12.5	10.0	8.2	6.6	5.7	4.4	4.3	3.3
23.....	23.4	18.5	11.4	9.1	7.6	6.0	5.2	4.0	4.0	3.0
24.....	24.5	17.0	10.5	8.4	7.0	5.5	4.8	3.7	3.6	2.8
25.....	19.8	15.7	9.7	7.7	6.4	5.0	4.4	3.4	3.4	2.6
26.....	18.3	14.5	8.9	7.1	5.9	4.7	4.1	3.1	3.1	2.4
27.....	17.0	13.4	8.2	6.6	5.5	4.3	3.8	2.9	2.9	2.2
28.....	15.8	12.5	7.7	6.2	5.1	4.0	3.5	2.7	2.7	2.0
29.....	14.7	11.6	7.2	5.8	4.7	3.8	3.3	2.5	2.5	1.9
30.....	13.7	10.9	6.7	5.4	4.5	3.5	3.0	2.3	2.3	1.8

For load of 250 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Manufacturers of Grain Elevator Machinery, Grain Shovels, &c.

We refer to many of the largest Grain Elevators in Chicago, Duluth, Minneapolis, Washburn, Winona, and many other places, which we have equipped.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 125 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

Distance between Supports in feet.	8 INCH.		7 INCH.		6 INCH.		5 INCH.		4 INCH.	
	23 lbs.	18 lbs.	20 lbs.	15½ lbs.	16 lbs.	13 lbs.	13 lbs.	10 lbs.	10 lbs.	7½ lbs.
5	61.3	49.3	48.5	37.6	32.6	26.7	21.4	16.9	13.2	10.0
6	42.6	34.2	33.7	26.2	22.6	18.6	14.9	11.8	9.1	7.0
7	31.3	25.1	24.7	19.2	16.6	13.6	11.0	8.6	6.7	5.1
8	23.9	19.3	19.0	14.7	12.7	10.4	8.4	6.6	5.1	3.9
9	19.0	15.2	15.0	11.6	10.1	8.2	6.6	5.2	4.1	3.1
10	15.3	12.3	12.1	9.4	8.1	6.7	5.4	4.2	3.3	2.5
11	12.6	10.2	10.0	7.8	6.7	5.5	4.4	3.5	2.7	2.1
12	10.6	8.6	8.4	6.6	5.7	4.6	3.7	2.9	2.3	1.8
13	9.0	7.3	7.2	5.6	4.8	3.9	3.2	2.5	1.9	1.5
14	7.8	6.3	6.2	4.8	4.2	3.4	2.7	2.2	1.7	1.3
15	6.8	5.4	5.4	4.2	3.6	3.0	2.4	1.8	1.4	1.1
16	6.0	4.8	4.7	3.7	3.2	2.6	2.1	1.7	1.3	1.0
17	5.3	4.2	4.2	3.3	2.8	2.3	1.8	1.4	1.1	.....
18	4.7	3.8	3.8	2.9	2.5	2.1	1.7	1.3	1.0	.....
19	4.2	3.4	3.4	2.6	2.2	1.8	1.5	1.2	.....	.....
20	3.8	3.1	3.0	2.4	2.0	1.7	1.3	1.1	.....	.....
21	3.4	2.8	2.7	2.2	1.8	1.5	1.2	1.0	.....	.....
22	3.2	2.6	2.5	1.9	1.7	1.4	1.1	.....	.....	.....

For load of 250 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Green Sand Castings.

Dry Sand Castings.

Loam Castings.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 150 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

Distance between Supports, in feet.	20 INCH.		15 INCH.		12 INCH.		10 INCH.		9 INCH.	
	80 lbs.	64 lbs.	50 lbs.	41 lbs.	40 lbs.	32 lbs.	33 lbs.	25½ lbs.	27 lbs.	21 lbs.
12.....	71.5	56.6	34.9	27.9	23.1	18.3	15.9	12.2	12.1	9.3
13.....	61.0	48.2	29.7	23.8	19.7	15.6	13.6	10.4	10.3	7.9
14.....	52.5	41.6	25.6	20.5	17.0	13.5	11.7	9.0	8.9	6.8
15.....	45.8	36.2	22.3	17.9	14.8	11.7	10.2	7.8	7.8	5.9
16.....	40.3	31.8	19.6	15.7	13.0	10.3	8.9	6.9	6.8	5.2
17.....	35.7	28.2	17.4	13.9	11.5	9.1	7.9	6.1	6.0	4.6
18.....	31.8	25.1	15.5	12.4	10.3	8.1	7.1	5.4	5.4	4.1
19.....	28.5	22.6	14.0	11.1	9.3	7.3	6.3	4.9	4.9	3.7
20.....	25.7	20.4	12.5	10.0	8.3	6.6	5.7	4.4	4.4	3.3
21.....	23.3	18.5	11.4	9.1	7.5	6.0	5.2	4.0	3.9	3.0
22.....	21.3	16.9	10.4	8.3	6.9	5.5	4.7	3.7	3.6	2.7
23.....	19.5	15.4	9.5	7.6	6.3	5.0	4.3	3.3	3.3	2.5
24.....	17.9	14.1	8.7	7.0	5.8	4.6	4.0	3.1	3.0	2.3
25.....	16.5	13.1	8.1	6.4	5.3	4.2	3.7	2.8	2.8	2.1
26.....	15.3	12.1	7.4	5.9	4.9	3.9	3.4	2.6	2.6	2.0
27.....	14.1	11.2	6.9	5.5	4.6	3.6	3.1	2.4	2.4	1.8
28.....	13.1	10.4	6.4	5.1	4.3	3.3	2.9	2.3	2.3	1.7
29.....	12.3	9.7	6.0	4.8	3.9	3.1	2.7	2.1	2.1	1.6
30.....	11.4	9.1	5.6	4.5	3.7	2.9	2.5	1.9	1.9	1.5

For load of 300 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We have the largest Steam Traveling Cranes in any Foundry in the Northwest.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 150 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

Distance between Supports in feet.	8 INCH.		7 INCH.		6 INCH.		5 INCH.		4 INCH.	
	22 lbs.	18 lbs.	20 lbs.	15¼ lbs.	16 lbs.	13 lbs.	13 lbs.	10 lbs.	10 lbs.	7¼ lbs.
5	51.1	41.1	40.4	31.3	27.1	22.3	17.9	14.1	11.0	8.4
6	35.5	28.5	28.1	21.8	18.9	15.5	12.4	9.8	7.6	5.8
7	26.1	20.9	20.6	16.0	13.9	11.3	9.1	7.2	5.6	4.3
8	19.9	16.1	15.8	12.3	10.6	8.7	7.0	5.5	4.3	3.3
9	15.8	12.7	12.5	9.7	8.4	6.9	5.5	4.3	3.4	2.6
10	12.8	10.3	10.1	7.9	6.8	5.6	4.5	3.5	2.7	2.1
11	10.5	8.5	8.3	6.5	5.6	4.6	3.7	2.9	2.3	1.7
12	8.9	7.1	7.0	5.5	4.7	3.9	3.1	2.4	1.9	1.5
13	7.5	6.1	6.0	4.7	4.0	3.3	2.7	2.1	1.6	1.3
14	6.5	5.2	5.2	4.0	3.5	2.8	2.3	1.8	1.4	1.1
15	5.7	4.6	4.5	3.5	3.0	2.5	2.0	1.6	1.2	0.9
16	5.0	4.0	3.9	3.1	2.7	2.2	1.7	1.4	1.1	.....
17	4.4	3.5	3.5	2.7	2.3	1.9	1.5	1.2	1.0	.....
18	3.9	3.2	3.1	2.4	2.1	1.7	1.4	1.1	.....	.....
19	3.5	2.9	2.8	2.2	1.9	1.5	1.3	1.0	.....	.....
20	3.2	2.6	2.5	2.0	1.7	1.4	1.1	.....	.....	.....
21	2.9	2.3	2.3	1.8	1.5	1.3	1.0	.....	.....	.....
22	2.6	2.1	2.1	1.6	1.4	1.1	.....	.....	.....	.....

For load of 300 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Angles, Tees, and all kinds of Shape Iron carried in stock.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 175 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

Distance between Supports, in feet.	20 INCH.		15 INCH.		12 INCH.		10 INCH.		9 INCH.	
	80 lbs.	64 lbs.	50 lbs.	41 lbs.	40 lbs.	32 lbs.	33 lbs.	25½ lbs.	27 lbs.	21 lbs.
12	61.3	48.5	29.9	23.9	19.8	15.7	13.7	10.5	10.4	7.9
13	52.3	41.3	25.5	20.4	16.9	13.3	11.7	8.9	8.9	6.8
14	45.0	35.6	21.9	17.6	14.6	11.5	10.1	7.7	7.7	5.8
15	39.3	31.0	19.1	15.3	12.7	10.1	8.7	6.7	6.7	5.1
16	34.5	27.3	16.8	13.5	11.2	8.8	7.7	5.9	5.9	4.5
17	30.6	24.2	14.9	11.9	9.9	7.8	6.8	5.2	5.2	3.9
18	27.3	21.6	13.3	10.6	8.8	7.0	6.1	4.7	4.6	3.5
19	24.5	19.4	11.9	9.5	7.9	6.2	5.4	4.2	4.2	3.1
20	22.1	17.5	10.8	8.6	7.1	5.6	4.9	3.8	3.8	2.9
21	20.0	15.8	9.8	7.8	6.5	5.1	4.5	3.4	3.4	2.6
22	18.2	14.4	8.9	7.1	5.9	4.7	4.1	3.1	3.1	2.3
23	16.7	13.2	8.1	6.5	5.4	4.3	3.7	2.9	2.9	2.2
24	15.3	12.1	7.5	6.0	5.0	3.9	3.4	2.6	2.6	2.0
25	14.1	11.2	6.9	5.5	4.6	3.6	3.1	2.4	2.4	1.8
26	13.1	10.3	6.4	5.1	4.2	3.3	2.9	2.2	2.2	1.7
27	12.1	9.6	5.9	4.7	3.9	3.1	2.7	2.1	2.1	1.6
28	11.3	8.9	5.5	4.4	3.6	2.9	2.5	1.9	1.9	1.5
29	10.5	8.3	5.1	4.1	3.4	2.7	2.3	1.8	1.8	1.4
30	9.8	7.8	4.8	3.8	3.2	2.5	2.2	1.7	1.7	1.3

For load of 350 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We make Fire Escapes of all modern styles and at lowest prices.

CARNEGIE **STEEL** BEAMS.

Spacing for equally distributed Load of 175 lbs. per square foot.

PROPER DISTANCE IN FEET, CENTER TO CENTER OF BEAMS.

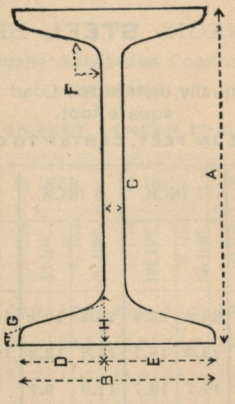
Distance between Supports in feet.	8 INCH.		7 INCH.		6 INCH.		5 INCH.		4 INCH.	
	22 lbs.	18 lbs.	20 lbs.	15½ lbs.	16 lbs.	13 lbs.	13 lbs.	10 lbs.	10 lbs.	7½ lbs.
5	43.8	35.2	34.6	26.9	23.3	19.1	15.3	12.1	9.4	7.2
6	30.4	24.4	24.0	18.7	16.2	13.3	10.6	8.4	6.5	5.0
7	22.3	18.0	17.7	13.7	11.9	9.7	7.8	6.2	4.8	3.7
8	17.1	13.8	13.5	10.5	9.1	7.5	6.0	4.7	3.7	2.8
9	13.5	10.9	10.7	8.3	7.2	5.9	4.7	3.7	2.9	2.2
10	11.0	8.8	8.6	6.7	5.8	4.8	3.8	3.0	2.3	1.8
11	9.0	7.3	7.1	5.6	4.8	3.9	3.2	2.5	1.9	1.5
12	7.6	6.1	6.0	4.7	4.1	3.3	2.7	2.1	1.7	1.3
13	6.5	5.2	5.1	4.0	3.4	2.8	2.3	1.8	1.4	1.1
14	5.6	4.5	4.4	3.4	3.0	2.4	1.9	1.5	1.2	0.9
15	4.9	3.9	3.8	3.0	2.6	2.1	1.7	1.3	1.0	.....
16	4.3	3.4	3.4	2.6	2.3	1.9	1.5	1.2	.....	.....
17	3.8	3.0	3.0	2.3	2.0	1.7	1.3	1.0	.....	.....
18	3.4	2.7	2.7	2.1	1.8	1.5	1.2	.....	.....	.....
19	3.0	2.4	2.4	1.9	1.6	1.3	1.1	.....	.....	.....
20	2.7	2.2	2.2	1.7	1.4	1.2	1.0	.....	.....	.....
21	2.5	2.0	1.9	1.5	1.3	1.1	.....	.....	.....	.....
22	2.3	1.8	1.8	1.4	1.2	1.0	.....	.....	.....	.....

For load of 350 pounds per square foot, divide the above spacing by two (2). Maximum fibre strain, 16,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

CARNEGIE STEEL BEAMS.



NUMBERS, WEIGHTS AND DIMENSIONS.

Number.	A Depth. Inches.	Weight Lbs.	B Width of Flange.	C Thickness of Web.	D Distance from Web to outisde of Flange.	E Same including Web.	F	G	H
301 b..	20	80	7.00	0.60	3.20	3.80	0.60	0.66	1.14
301 a..	20	64	6.25	0.50	2.875	3.375	0.60	0.55	0.98
302 b..	15	50	5.75	0.45	2.65	3.10	0.55	0.55	0.95
302 a..	15	41	5.50	0.40	2.55	2.95	0.55	0.40	0.78
303 b..	12	40	5.50	0.39	2.555	2.945	0.50	0.50	0.88
303 a..	12	32	5.25	0.35	2.45	2.80	0.50	0.35	0.72
304 b..	10	33	5.00	0.37	2.315	2.685	0.45	0.47	0.82
304 a..	10	25.5	4.75	0.32	2.215	2.535	0.45	0.32	0.65
305 b..	9	27	4.75	0.31	2.22	2.53	0.41	0.42	0.75
305 a..	9	21	4.50	0.27	2.115	2.385	6.41	0.28	0.60
306 b..	8	22	4.50	0.27	2.115	2.385	0.37	0.35	0.67
306 a..	8	18	4.25	0.25	2.00	2.25	0.37	0.26	0.56
307 b..	7	20	4.25	0.27	1.99	2.26	0.33	0.35	0.65
307 a..	7	15½	4.00	0.23	1.885	2.115	0.33	0.25	0.53
308 b..	6	16	3.625	0.26	1.6825	1.9425	0.29	0.34	0.56
308 a..	6	13	3.50	0.23	1.635	1.865	0.29	0.25	0.50
309 b..	5	13	3.13	0.26	1.435	1.695	0.25	0.33	0.54
309 a..	5	10	3.00	0.22	1.39	1.61	0.25	0.23	0.44
310 b..	4	10	2.75	0.24	1.255	1.495	0.22	0.30	0.49
310 a..	4	7½	2.625	0.20	1.2125	1.4125	0.22	0.20	0.38

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

CARNEGIE IRON BEAMS.

ON the following page we give a table of IRON BEAMS, with the number, weight and dimensions of each section as now made by Carnegie Bros.

Please notice that the old weights and sections have been very materially changed.

Following this table we give the SAFE LOADS, and then the proper spaces for loads of 100, 125, 150, 175, 200, 250, 300 and 350 lbs. per square foot.

We can furnish these beams at the lowest market prices, as we have SPECIAL FACILITIES for fitting, punching and generally working both Iron and Steel Beams.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Send for Plans and Estimates for
ROOF TRUSSES.

CARNEGIE **IRON** BEAMS.

Safe Loads equally distributed in Tons of 2,000 lbs.

Distance between Supports in feet.	15 INCH.			12 INCH.		10½ INCH.		10 INCH.		9 INCH.			
	80 lbs.	60 lbs.	50 lbs.	56½ lbs.	42 lbs.	40 lbs.	31½ lbs.	36 lbs.	30 lbs.	45 lbs.	38½ lbs.	28½ lbs.	23½ lbs.
12	36.17	27 80	23.23	19.37	15.27	12.80	10.47	11.37	9.72	12.85	11.12	8.17	6 83
13	33.39	25.66	21.45	17.88	14.09	11.81	9.65	10.50	8.97	11.86	10 26	7.54	6.31
14	31.00	23.83	19.91	16.60	13.09	10.97	8.97	9.75	8.33	11.01	9.53	7.00	5.86
15	28.93	22.24	18.59	15.49	12.21	10 24	8.37	9.10	7.78	10.28	8.90	6.53	5.47
16	27.13	20 85	17 43	14.52	11.45	9.60	7.85	8.53	7 29	9 64	8.34	6.13	5.13
17	25.53	19.63	16.40	13.67	10.78	9.04	7.39	8.03	6.86	9.07	7.85	5.77	4.82
18	24.11	18 53	15.49	12.91	10.18	8.53	6.98	7 58	6.48	8.57	7.41	5.44	4.56
19	22.84	17.56	14.67	12.23	9.64	8.08	6.61	7.18	6.14	8.12	7.02	5.16	4.32
20	21 70	16.68	13.94	11.62	9.16	7.68	6.28	6.83	5.83	7.71	6.67	4.90	4.10
21	20 67	15 89	13.28	11.07	8.7.	7 31	5.98	6 50	5.56	7 34	6.36	4.67	3.90
22	19.73	15.17	12.67	10.56	8.33	6.98	5.71	6.20	5.30	7.01	6.07	4.45	3.73
23	18.87	14 51	12.12	10.10	7.97	6.68	5.46	5.93	5.07	6.70	5.80	4.26	3.57
24	18.08	13.90	11.62	9 68	7 63	6.40	5.23	5.69	4.86	6.42	5.56	4.08	3.42
25	17.36	13.34	11.15	9.30	7 33	6.14	5.02	5.40	4.67	6.17	5.33	3.92	3.28
26	16.69	12.83	10.72	8.94	7.05	5.91	4.83	5.25	4.49	5.93	5.13	3.77	3.15
27	16.07	12.35	10.33	8.61	6.79	5.69	4.65	5.06	4.32	5.71	4.94	3.63	3.04
28	15.50	11.91	9.96	8 30	6.54	5.49	4.49	4.88	4.17	5.51	4.77	3.50	2.93
29	14.96	11.50	9 61	8.01	6 32	5.30	4.33	4.71	4.02	5.32	4.60	3.38	2.83
30	14.47	11.12	9 29	7 75	6.11	5.12	4.19	4 55	3.89	5.14	4.45	3.27	2.73

Safe loads given include weight of beam. Maximum fibre strain 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Plate and Box Girders Made to Order. Send for Estimates.

CARNEGIE **IRON** BEAMS.

Safe Load equally distributed in Tons of 2,000 lbs.

Distance between Supports in feet.	8 INCH.			7 INCH.		6 INCH.		5 INCH.		4 IN.	3 INCH.	
	35 lbs.	27 lbs.	21½ lbs.	22½ lbs.	18 lbs.	16 lbs.	13½ lbs.	12 lbs.	10 lbs.	7 lbs.	9 lbs.	5½ lbs.
5	22.39	16.51	13.23	11.85	10.11	7.74	6.51	4.60	4.00	2.28	1.89	1.34
6	18.66	13.76	11.03	9.88	8.43	6.45	5.43	3.83	3.33	1 90	1.58	1.12
7	15.99	11.79	9.45	8.47	7.22	5.53	4.65	3.29	2.86	1.63	1.35	0.96
8	14.00	10 32	8.27	7.41	6.32	4.84	4.07	2.88	2.50	1.43	1.18	0.84
9	12.44	9.17	7.35	6.58	5.62	4.30	3.62	2.56	2.22	1.27	1.05	0.74
10	11.20	8.26	6.62	5.93	5.06	3.87	3.26	2.30	2.00	1.14	0.95	0.67
11	10.18	7.50	6.01	5.39	4.60	3.52	2.96	2.09	1.82	1.04	0.86	0.61
12	9.33	6.88	5.51	4.94	4.21	3.22	2.71	1.92	1.67	0.95	0.79	0.56
13	8.61	6.35	5.09	4.56	3.89	2.98	2.50	1.77	1.54	0.88	0.73	0.52
14	8.00	5.90	4.73	4.23	3.61	2.76	2.33	1.64	1.43	0 81	0.68	0.48
15	7.46	5.50	4.41	3.95	3.37	2.58	2.17	1.53	1.33	0.76	0.63	0.45
16	7.00	5.16	4.13	3.70	3.16	2.42	2.03	1.44	1.25	0.71	0.59	0.42
17	6.59	4.86	3 89	3.49	2.97	2.28	1.91	1 35	1.18	0.67	0.56	0.39
18	6.22	4.59	3.68	3.29	2 81	2.15	1.81	1.28	1.11	0.63	0.53	0.57
19	5.89	4.34	3.48	3.12	2.66	2.04	1.71	1.21	1.05	0.60	0.50	0.35
20	5.60	4.13	3.31	2.96	2.53	1.94	1.63	1.15	1.00	0.57	0.47	0.34
21	5.33	3.93	3.15	2 82	2.41	1.84	1 55	1.10	0.95	0 54	0.45	0.32

Safe loads given include weight of beam. Maximum fiber strain 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

It is a part of our business to make estimates on Iron Work. Correspondence Solicited.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 100 lbs. per square foot.

Distance between Supports in feet.	15 INCH.			12 INCH.		10½ INCH.		10 INCH.		9 INCH.			
	80 lbs.	60 lbs.	50 lbs.	56½ lbs.	42 lbs.	40 lbs.	31½ lbs.	36 lbs.	30 lbs.	45 lbs.	38½ lbs.	28½ lbs.	23½ lbs.
12	60.3	46.3	38.7	32.3	25.4	21.3	17.4	19.0	16.2	21.4	18.5	13.6	11.4
13	51.4	39.5	33.0	27.5	21.7	18.2	14.9	16.2	13.8	18.2	15.8	11.6	9.7
14	44.3	34.0	28.5	23.7	18.7	15.7	12.8	13.9	11.9	15.7	13.6	10.0	8.4
15	38.6	29.7	24.8	20.7	16.3	13.6	11.2	12.1	10.4	13.7	11.9	8.7	7 3
16	33.9	26.1	21.8	18.2	14.3	12.0	9.8	10.7	9.1	12.0	10.4	7.7	6 4
17	30.0	23.1	19.3	16.1	12.7	10.6	8.7	9.4	8.1	10.7	9.2	6.8	5 7
18	26.8	20.6	17.2	14.3	11.3	9.5	7.8	8.4	7.2	9 5	8.2	6.0	5.1
19	24.0	18.5	15.4	12.9	10.2	8.5	7.0	7.6	6.5	8.5	7.4	5.4	4.5
20	21.7	16.7	13.9	11.6	9.2	7 7	6.3	6.8	5.8	7.7	6.7	4.9	4.1
21	19.7	15.1	12.6	10.5	8 3	7.0	5.7	6.2	5.3	7.0	6.1	4.4	3.7
22	17.9	13.8	11.5	9.6	7.6	6 3	5.2	5.6	4.8	6 4	5.5	4.1	3.4
23	16.4	12.6	10.5	8.8	6.9	5.8	4.7	5.2	4.4	5.8	5.0	3.7	3.1
24	15.1	11.6	9.7	8.1	6.4	5.3	4.4	4.7	4.0	5.4	4.6	3.4	2.8
25	13.9	10.7	8.9	7.4	5.9	4.9	4.0	4.4	3.7	4.9	4.3	3.1	2.6
26	12.8	9.9	8.2	6.9	5.4	4.5	3 7	4.0	3.5	4.6	3.9	2.9	2.4
27	11.9	9.2	7.6	6.4	5.0	4.2	3.4	3.7	3.2	4.2	3.7	2.7	2.2
28	11.1	8.5	7.1	5.9	4.7	3.9	3.2	3.5	3.0	3.9	3.4	2.5	2.1
29	10 3	7.9	6.6	5.5	4.4	3.7	3.0	3.2	2.8	3.7	3.2	2.3	2.0
30	9.6	7.4	6.2	5.2	4.1	3.4	2.8	3.0	2.6	3.4	3.0	2.2	1.8

For load of 200 pounds per square foot divide the spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We make all kinds of Stair and Railing work, and will send Cuts on application.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 100 lbs. per square foot.

Distance between Supports in feet.	8 INCH.			7 INCH.		6 INCH.		5 INCH.		4 IN.	3 INCH.	
	36 lbs.	27 lbs.	21½ lbs.	22 lbs.	18 lbs.	16 lbs.	13½ lbs.	12 lbs.	10 lbs.	7 lbs.	9 lbs.	5½ lbs.
5	89.6	66.0	52.9	47.4	40.4	31.0	26.0	18.4	16.0	9.1	7.6	5.4
6	62.2	45.9	36.8	32.9	28.1	21.5	18.1	12.8	11.1	6.3	5.3	3.7
7	45.7	33.7	27.0	24.2	20.6	15.8	13.3	9.4	8.2	4.7	3.9	2.7
8	35.0	25.8	20.7	18.5	15.8	12.1	10.2	7.2	6.3	3.6	3.0	2.1
9	27.7	20.4	16.3	14.6	12.5	9.6	8.0	5.7	4.9	2.8	2.3	1.6
10	22.4	16.5	13.2	11.9	10.1	7.7	6.5	4.6	4.0	2.3	1.9	1.3
11	18.5	13.6	10.9	9.8	8.4	6.4	5.4	3.8	3.3	1.9	1.6	1.1
12	15.6	11.5	9.2	8.2	7.0	5.4	4.5	3.2	2.8	1.6	1.3	0.9
13	13.3	9.8	7.8	7.0	6.0	4.6	3.9	2.7	2.4	1.3	1.1	....
14	11.4	8.4	6.8	6.0	5.2	3.9	3.3	2.3	2.0	1.2	1.0	....
15	10.0	7.3	5.9	5.3	4.5	3.4	2.9	2.0	1.8	1.0	....	....
16	8.8	6.4	5.2	4.6	3.9	3.0	2.5	1.8	1.6	.....	....	....
17	7.8	5.7	4.6	4.1	3.5	2.7	2.3	1.6	1.4	.....	....	....
18	6.9	5.1	4.1	3.7	3.1	2.4	2.0	1.4	1.2	.....	....	....
19	6.2	4.6	3.7	3.3	2.8	2.1	1.8	1.3	1.1	.....	....	....
20	5.6	4.1	3.3	3.0	2.5	1.9	1.6	1.2	1.0	.....	....	....
21	5.1	3.7	3.0	2.7	2.3	1.8	1.5	1.0	....	.....	....	....
22	4.6	3.4	2.7	2.4	2.1	1.6	1.3	....	....	.....	....	....

For load of 200 pounds per square foot, divide spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We carry Steel and Iron Beams in Stock.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 125 lbs. per square foot.

Distance between Supports in feet.	15 INCH.			12 INCH.		10½ INCH.		10 INCH.		9 INCH.			
	80 lbs.	60 lbs.	50 lbs.	50½ lbs.	42 lbs.	40 lbs.	31½ lbs.	36 lbs.	30 lbs.	45 lbs.	38½ lbs.	28½ lbs.	23½ lbs.
12	48.2	37.0	31.0	25.8	20.3	17.0	13.9	15.2	13.0	17.1	14.8	10.9	9.1
13	41.1	31.6	26.4	22.0	17.4	14.6	11.9	13.0	11.0	14.6	12.6	9.3	7.8
14	35.4	27.2	22.8	19.0	15.0	12.5	10.3	11.1	9.5	12.6	10.9	8.0	6.7
15	30.9	23.7	19.8	16.5	13.0	10.9	8.9	9.7	8.3	11.0	9.5	7.0	5.8
16	27.1	20.9	17.4	14.5	11.5	9.6	7.9	8.5	7.3	9.6	8.3	6.1	5.1
17	24.0	18.5	15.4	12.9	10.1	8.5	7.0	7.5	6.5	8.5	7.4	5.4	4.5
18	21.4	16.5	13.8	11.5	9.0	7.6	6.2	6.7	5.8	7.6	6.6	4.8	4.1
19	19.2	14.8	12.3	10.3	8.1	6.8	5.6	6.1	5.2	6.8	5.9	4.3	3.6
20	17.4	13.3	11.1	9.3	7.3	6.1	5.0	5.5	4.7	6.2	5.3	3.9	3.3
21	15.7	12.1	10.1	8.4	6.6	5.6	4.6	5.0	4.3	5.6	4.9	3.5	3.0
22	14.3	11.0	9.2	7.7	6.1	5.1	4.2	4.5	3.9	5.1	4.4	3.3	2.7
23	13.1	10.1	8.4	7.0	5.5	4.6	3.8	4.1	3.5	4.7	4.0	3.0	2.5
24	12.1	9.3	7.7	6.5	5.1	4.3	3.5	3.8	3.2	4.3	3.7	2.7	2.3
25	11.1	8.5	7.1	5.9	4.7	3.9	3.2	3.5	3.0	3.9	3.4	2.5	2.1
26	10.3	7.9	6.6	5.5	4.3	3.6	3.0	3.2	2.8	3.6	3.2	2.3	1.9
27	9.5	7.3	6.1	5.1	4 0	3.4	2.7	3.0	2.6	3.4	2.9	2.2	1.8
28	8.9	6.8	5.7	4.7	3.7	3.1	2 6	2.8	2.4	3.1	2.7	2.0	1.7
29	8.3	6.3	5.3	4.4	3.5	2.9	2.4	2.6	2.2	2.9	2 5	1.9	1.6
30	7.7	5.9	5.0	4.1	3.3	2.7	2.2	2.4.	2.1	2.7	2.4	1.7	1.5

For load of 250 pounds per square foot divide the spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Lamp Posts and Water and Gas Special Pipe are some of our products.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 125 lbs. per square foot.

Distance between Supports in feet.	8 INCH.			7 INCH.		6 INCH.		5 INCH.		4 IN.	3 INCH.	
	35 lbs.	27 lbs.	21½ lbs.	22 lbs.	18 lbs.	16 lbs.	13½ lbs.	12 lbs.	10 lbs.	7 lbs.	9 lbs.	5½ lbs.
5	71.7	52.8	42.3	37.9	32.3	24.8	20.8	14.7	12 8	7.3	6.1	4.3
6	49.8	36.7	29.4	26.3	22.5	17.2	14.5	10.2	8,9	5.1	4.2	3.0
7	36.6	27.0	21.6	19.3	16.5	12.6	10.6	7.5	6.5	3.7	3.1	2.2
8	28.0	20.6	16 5	14.8	12.6	9 7	8.1	5.8	5.0	2.9	2.4	1.7
9	22.1	16.3	13.1	11.7	10 0	7.7	6 4	4.5	3.9	2.3	1.9	1.3
10	17.9	13.2	10.6	9.5	8.1	6.2	5.2	3.7	3 2	1.8	1.5	1.1
11	14.8	10 9	8.7	7.8	6.7	5.1	4.3	3.0	2.6	1.5	1.3	0.9
12	12.4	9.2	7.4	6.6	5.6	4 3	3.6	2.6	2.2	1.3	1.1	....
13	10.6	7.8	6 3	5.6	4.8	3.7	3.1	2 2	1.9	1.1	0.9	....
14	9.1	6.7	5.4	4.8	4.1	3.2	2.7	1.9	1.6	0.9	....	....
15	8.0	5.9	4.7	4.2	3.6	2.7	2.3	1.6	1.4	.....	....	....
16	7.0	5.2	4.1	3.7	3.2	2.4	2.0	1.4	1.3	.....	....	....
17	6.2	4.6	3.7	3.3	2.8	2.1	1.8	1.3	1.1	.....	....	....
18	5.5	4.1	3.3	2.9	2.5	1.9	1.6	1.1	1 0	.....	....	....
19	5.0	3.7	2.9	2.6	2.2	1.7	1.4	1 0	....	.....	....	....
20	4.5	3.3	2.6	2.4	2.0	1.5	1.3	....	....	.....	....	....
21	4.1	3.0	2.4	2.2	1.8	1.4	1.2	....	....	.....	....	....
22	3.7	2.7	2.2	2.0	1.7	1.3	1.1	....	....	.....	....	....

For load of 250 pounds per square foot, divide spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Castings of all kinds made in the best manner.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 150 lbs. per square foot.

Distance between Supports in feet.	15 INCH.			12 INCH.		10½ INCH.		10 INCH.		9 INCH.			
	80 lbs.	60 lbs.	50 lbs.	50½ lbs.	42 lbs.	40 lbs.	31½ lbs.	35 lbs.	30 lbs.	45 lbs.	38½ lbs.	28½ lbs.	23½ lbs.
12	40.2	30.9	25.8	21.5	16.9	14.2	11.6	12.7	10.8	14.3	12.3	9.1	7.6
13	34.3	26.3	22.0	18.3	14.5	12.1	9.9	10.8	9.2	12.1	10.5	7.7	6.5
14	29.5	22.7	19.0	15.8	12.5	10.5	8.5	9.3	7.9	10.5	9.1	6.7	5.6
15	25.7	19.8	16.5	13.8	10.9	9.1	7.5	8.1	6.9	9.1	7 9	5.8	4.9
16	22.6	17.4	14.5	12.1	9.5	8.0	6.5	7.1	6.1	8.0	6.9	5.1	4.3
17	20.0	15.4	12.9	10.7	8.5	7.1	5.8	6.3	5.4	7.1	6.1	4.5	3.8
18	17.9	13.7	11.5	9.5	7.5	6.3	5.2	5.6	4.8	6.3	5.5	4.0	3.4
19	16.0	12.3	10.3	8.6	6.8	5.7	4.7	5.1	4.3	5.7	4.9	3.6	3.0
20	14.5	11.1	9.3	7.7	6.1	5.1	4.2	4.5	3.9	5.1	4.5	3.3	2.7
21	13.1	10.1	8.4	7.0	5.5	4.7	3.8	4.1	3.5	4.7	4.1	2.9	2.5
22	11.9	9.2	7 7	6.4	5.1	4.2	3.5	3.7	3.2	4.3	3.7	2.7	2.3
23	10.9	8.4	7.0	5.9	4.6	3.9	3.1	3.5	2.9	3.9	3.3	2.5	2.1
24	10.1	7.7	6.5	5.4	4.2	3.5	2 9	3.1	2.7	3.6	3.1	2.3	1.9
25	9.3	7.1	5.9	4.9	3.9	3.3	2.7	2.9	2 5	3.3	2.9	2.1	1.7
26	8.5	6.6	5.5	4.6	3.6	3.0	2.5	2.7	2.3	3.0	2.6	1.9	1.6
27	7.9	6.1	5.1	4.3	3.3	2.8	2.3	2 5	2.1	2.8	2.5	1.8	1.5
28	7.4	5.7	4.7	3.9	3.1	2.6	2.1	2 3	2.0	2.6	2.3	1.7	1.4
29	6.9	5.3	4.4	3.7	2.9	2.5	2.0	2.1	1.9	2.5	2.1	1.5	1.3
30	6.4	4.9	4.1	3.5	2.7	2.3	1.9	2.0	1.7	2.3	2.0	1.5	1.2

For load of 300 pounds per square foot, divide the spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square foot.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We can refer to some of the largest buildings in the Northwest as samples of our work.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 150 lbs. per square foot.

Distance between Supports in feet.	8 INCH.			7 INCH.		6 INCH.		5 INCH.		4 IN.	3 INCH.	
	35 lbs.	27 lbs.	21½ lbs.	22 lbs.	18 lbs.	16 lbs.	13½ lbs.	12 lbs.	10 lbs.	7 lbs.	9 lbs.	5½ lbs.
5	59.7	44.0	35.3	31.6	26.9	20.7	17.3	12.3	10.7	6.1	5.1	3.6
6	41 5	30.6	24.5	21.9	18.7	14.3	12.1	8.5	7.4	4.2	3.5	2.5
7	30.5	22.5	18.0	16.1	13.7	10.5	8.9	6.3	5.5	3.1	2.6	1.8
8	23.3	17.2	13.8	12.3	10.5	8.1	6.8	4.8	4.2	2.4	2.0	1.4
9	18.5	13.6	10.9	9.7	8 3	6 4	5.3	3 8	3.3	1 9	1.5	1.1
10	14.9	11.0	8.8	7.9	6.7	5.1	4.3	3.1	2.7	1.5	1.3	0.9
11	12.3	9.1	7.3	6.5	5.6	4.3	3.6	2.5	2.2	1.3	1.1	....
12	10.4	7.7	6.1	5.5	4.7	3.6	3.0	2.1	1.9	1.1	....	....
13	8.9	6.5	5.2	4.7	4.0	3.1	2.6	1.8	1.6	0.9	....	....
14	7.6	5.6	4.5	4.0	3.5	2.6	2.2	1.5	1.3	.....	....	....
15	6.7	4.9	3.9	3.5	3.0	2.3	1.9	1.3	1.2	.....	....	....
16	5.9	4.3	3 5	3.1	2.6	2.0	1.7	1.2	1.1	.....	....	....
17	5.2	3.8	3.1	2.7	2.3	1.8	1.5	1.1	0 9	.....	....	....
18	4.6	3.4	2.7	2.5	2.1	1.7	1.3	0.9	....	.....	....	....
19	4.1	3 1	2.5	2.2	1.9	1.4	1.2	....	....	.....	....	....
20	3.7	2.7	2.2	2.0	1.6	1.3	1.1	....	....	.....	....	....
21	3.4	2.5	2.0	1.8	1.5	1.2	1.0	....	....	.....	....	....
22	3.1	2.3	1.8	1.6	1.4	1.1	.....	....	....	.....	....	....

For load of 300 pounds per square foot, divide spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Cuts of Patterns shown in this book represent only a small portion of our stock.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 175 lbs. per square foot.

Distance between Supports in feet.	15 INCH.			12 INCH.		10½ INCH.		10 INCH.			9 INCH.		
	80 lbs.	60 lbs.	50 lbs.	56½ lbs.	42 lbs.	40 lbs.	31½ lbs.	36 lbs.	30 lbs.	45 lbs.	38½ lbs.	28½ lbs.	23½ lbs.
12	34.5	26.5	22.1	18.5	14.5	12.2	9.9	10 9	9.3	12.2	10.6	7.8	6.5
13	29.4	22 6	18.9	15.7	12.4	10.4	8.5	9.3	7.9	10.4	9.0	6.6	5.5
14	25.3	19.4	16.3	13.5	10.7	9.0	7.3	7.9	6.8	9 0	7.8	5.7	4.8
15	22.1	17.0	14.2	11.8	9.3	7.8	6.4	6 9	5 9	7.8	6.8	5.0	4.2
16	19.4	14.9	12.5	10.4	8.2	6.9	5.6	6.1	5.2	6.9	5.9	4.4	3.7
17	17.1	13.2	11.0	9.2	7.3	6.1	5.0	5.4	4.6	6.1	5.3	3.9	3.3
18	15.3	11.8	9.8	8.2	6.5	5.4	4.5	4.8	4.1	5.4	4.7	3.4	2.9
19	13.7	10.6	8.8	7.4	5.8	4.9	4.0	4.3	3.7	4.9	4.2	3.1	2.6
20	12.4	9.5	7.9	6.6	5.3	4.4	3.6	3.9	3.3	4.4	3.8	2.8	2.4
21	11.3	8.6	7.2	6.0	4.8	4.0	3.3	3.5	3.0	4.0	3.8	2.5	2.1
22	10.2	7.9	6.6	5.5	4.3	3.6	3.0	3.2	2.7	3.7	3.5	2.3	1.9
23	9.4	7.2	6.0	5.0	3.9	3.3	2.7	3.0	2.5	3.3	3.1	2.1	1.8
24	8.6	6.6	5 5	4.6	3.6	3.0	2.5	2 7	2.3	3.1	2.9	1.9	1.6
25	7.9	6.1	5.1	4 2	3.4	2.8	2.3	2.5	2.1	2.8	2.6	1.8	1.5
26	7.3	5.7	4.7	3.9	3.1	2.6	2.1	2.3	2.0	2.6	2.2	1.7	1 4
27	6.8	5.3	4 3	3.7	2.9	2.4	1.9	2.1	1.8	2.4	2.1	1.5	1 3
28	6.3	4.9	4.1	3.4	2.7	2.2	1.8	2.0	1.7	2.2	1.9	1.4	1.2
29	5.9	4 5	3.8	3.2	2.5	2.1	1.7	1.8	1.6	2.1	1.8	1.3	1.1
30	5.5	4.2	3.5	3.0	2.3	1.9	1.6	1.7	1.5	1.9	1.7	1.3	1.0

For load of 350 pounds per square foot, divide the spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Contracts Taken in any Part of the Country.

CARNEGIE **IRON** BEAMS.

Spacing for uniform Load of 175 lbs. per square foot.

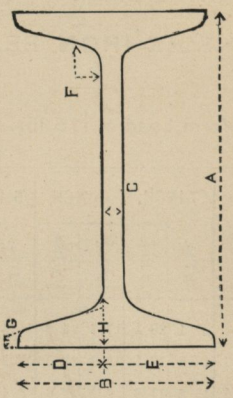
Distance between Supports in feet.	8 INCH.			7 INCH.		6 INCH.		5 INCH.		4 IN.	3 INCH.	
	35 lbs.	27 lbs.	21½ lbs.	22 lbs.	18 lbs.	16 lbs.	13½ lbs.	12 lbs.	10 lbs.	7 lbs.	9 lbs.	5¾ lbs.
5	51.2	37.7	30.2	27.1	23.1	17.7	14.9	10.5	9.1	5.2	4.3	3.1
6	35.5	26.2	21.0	18.8	16.1	12.3	10.3	7.3	6.3	3.6	3.0	2.1
7	26.1	19.3	15.4	13.8	11.8	9.0	7.6	5.4	4.7	2.7	2.2	1.5
8	20.0	14.7	11.8	10.6	9.0	6.9	5.8	4.1	3.6	2.1	1.7	1.2
9	15.8	11.7	9.3	8.3	7.1	5.5	4.6	3.3	2.8	1.6	1.3	1.0
10	12.8	9.4	7.5	6.8	5.8	4.4	3.7	2.6	2.3	1.3	1.1	.....
11	10.6	7.8	6.2	5.6	4.8	3.7	3.1	2.2	1.9	1.1	0.9	.....
12	8.9	6.6	5.3	4.7	4.0	3.1	2.6	1.8	1.6	0.9	.....	.....
13	7.6	5.6	4.5	4.0	3.4	2.6	2.2	1.5	1.4	.....	.....	.....
14	6.5	4.8	3.9	3.4	3.0	2.2	1.9	1.3	1.1	.....	.....	.....
15	5.7	4.2	3.4	3.0	2.6	1.9	1.7	1.1	1.0	.....	.....	.....
16	5.0	3.7	3.0	2.6	2.3	1.7	1.5	1.0	.....	.....	.....	.....
17	4.5	3.3	2.6	2.3	2.0	1.5	1.3	.....	.....	.....	.....	.....
18	4.0	2.9	2.3	2.1	1.8	1.4	1.1	.....	.....	.....	.....	.....
19	3.5	2.6	2.1	1.9	1.6	1.2	1.0	.....	.....	.....	.....	.....
20	3.2	2.3	1.9	1.7	1.4	1.1	.....	.....	.....	.....	.....	.....
21	2.9	2.1	1.7	1.5	1.3	1.0	.....	.....	.....	.....	.....	.....
22	2.6	1.9	1.6	1.4	1.2	.....	.....	.....	.....	.....	.....	.....

For load of 350 pounds per square foot, divide the spacing given by two (2). Maximum fibre strain, 12,000 lbs. per square inch.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

CARNEGIE IRON BEAMS.



NUMBERS, WEIGHTS AND DIMENSIONS.

Number.	A Depth. Inches.	Weight Lbs.	B Width of Flange.	C Thickness of Web.	D Distance from Web to outside of Flange.	E Same including Web.	F	G	H
1	15	80	6.08	0.76	2.66	3.42	0.88	0.81	1.56
2 a ...	15	60	5.45	0.57	2.44	3.01	0.75	0.69	1.25
2 b ...	15	50	5.05	0.49	2.28	2.77	0.75	0.56	1.13
3 b ...	12	56½	5.16	0.78	2.19	2.97	0.56	0.56	1.19
3 a ...	12	42	4.63	0.51	2.06	2.57	0.50	0.50	1.06
4 b ...	10½	40	4.80	0.55	2.125	2.675	0.44	0.53	0.94
4 a ...	10½	31½	4.53	0.41	2.06	2.47	0.38	0.38	0.88
5 b ...	10	36	4.50	0.44	2.03	2.47	0.44	0.50	1.06
5 a ...	10	30	4.31	0.37	1.97	2.34	0.44	0.41	0.94
7	9	45	5.02	0.52	2.25	2.77	0.69	0.66	1.31
6 c ...	9	38½	4.71	0.46	2.125	2.585	0.63	0.56	1.19
6 b ...	9	28½	4.16	0.40	1.88	2.28	0.44	0.44	0.88
6 a ...	9	23½	3.96	0.34	1.81	2.15	0.44	0.31	0.81
8 c ...	8	35	4.60	0.35	2.125	2.475	0.63	0.63	1.19
8 b ...	8	27	4.09	0.41	1.84	2.25	0.44	0.41	0.91
8 a ...	8	21½	3.71	0.33	1.69	2.02	0.38	0.34	0.78
9 b ...	7	22	3.82	0.38	1.72	2.10	0.38	0.38	0.78
9 a ...	7	18	3.52	0.26	1.63	1.89	0.38	0.34	0.75
11 b ...	5	12	2.96	0.28	1.34	1.62	0.31	0.25	0.56
11 a ...	5	10	2.85	0.23	1.31	1.54	0.25	0.22	0.50
10 b ...	6	16	3.44	0.25	1.595	1.845	0.37	0.31	0.72
10 a ...	6	13½	3.24	0.24	1.50	1.74	0.31	0.25	0.62
13 b ...	3	9	2.58	0.40	1.09	1.49	0.25	0.22	0.47
13 a ...	3	5½	2.22	0.16	1.03	1.19	0.25	0.19	0.38
12	4	7	2.50	0.18	1.16	1.34	0.25	0.19	0.41

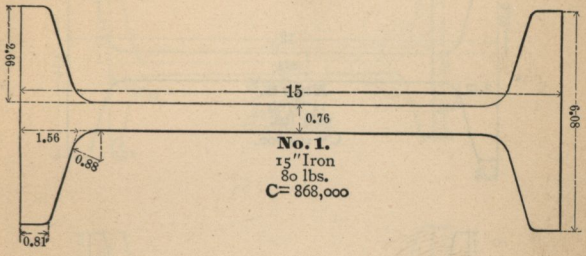
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

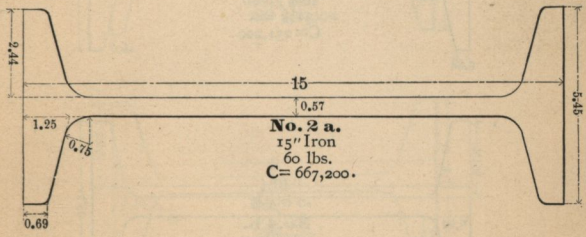
CARNEGIE'S

NEW SECTIONS OF BEAMS,

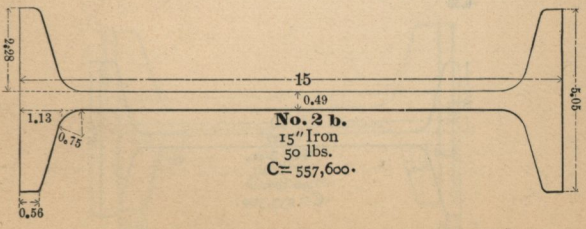
IRON.



No. 1.
15" Iron
80 lbs.
C= 868,000



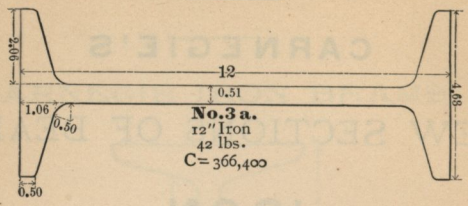
No. 2 a.
15" Iron
60 lbs.
C= 667,200.



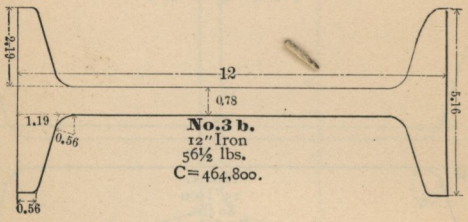
No. 2 b.
15" Iron
50 lbs.
C= 557,600.

BOUTON · FOUNDRY · COMPANY.

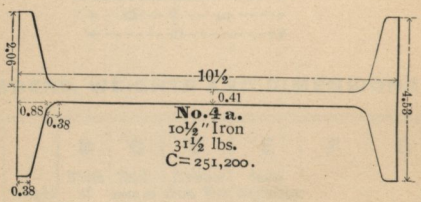
2600 Archer Avenue, Chicago.



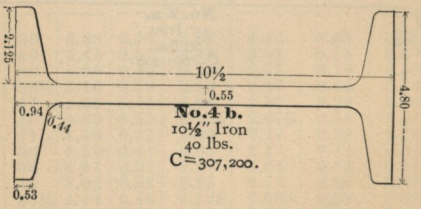
No. 3 a.
12″ Iron
42 lbs.
C = 366,400



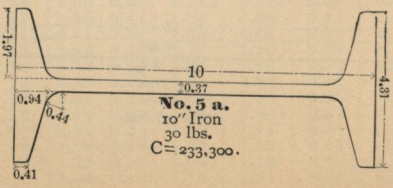
No. 3 b.
12″ Iron
56½ lbs.
C = 464,800.



No. 4 a.
10½″ Iron
31½ lbs.
C = 251,200.



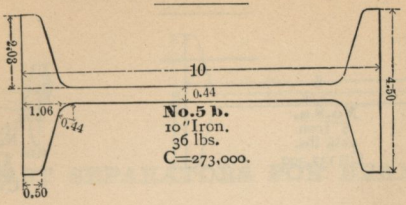
No. 4 b.
10½″ Iron
40 lbs.
C = 307,200.



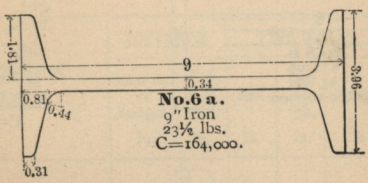
No. 5 a.
10″ Iron
30 lbs.
C = 233,300.

BOUTON · FOUNDRY · COMPANY,

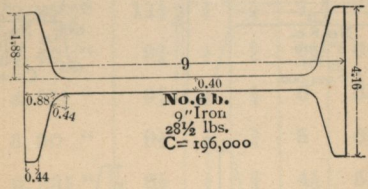
2600 Archer Avenue, Chicago.



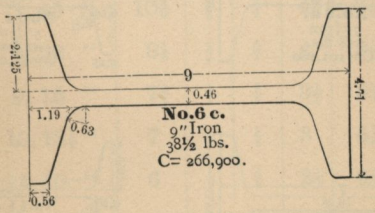
No.5 b.
10″Iron.
36 lbs.
C=273,000.



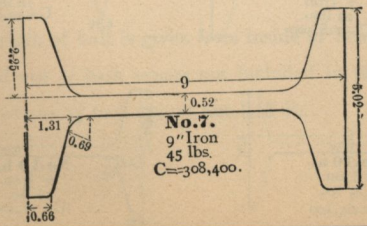
No.6 a.
9″Iron
23½ lbs.
C=164,000.



No.6 b.
9″Iron
28½ lbs.
C= 196,000



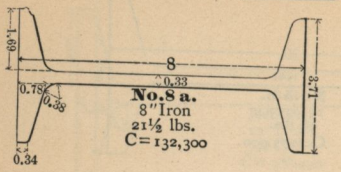
No.6 c.
9″Iron
38½ lbs.
C= 266,900.



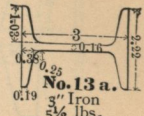
No.7.
9″Iron
45 lbs.
C=308,400.

BOUTON · FOUNDRY · COMPANY,

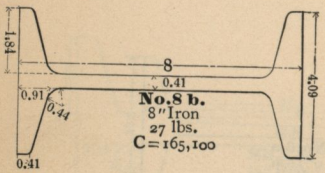
2600 Archer Avenue, Chicago.



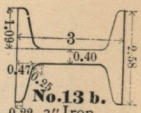
No. 8 a.
8" Iron
21½ lbs.
C= 132,300



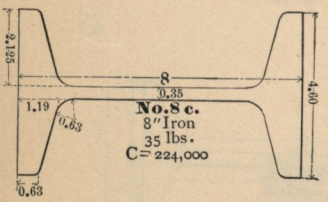
No. 13 a.
3" Iron
5½ lbs.
C= 13,400.



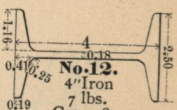
No. 8 b.
8" Iron
27 lbs.
C= 165,100



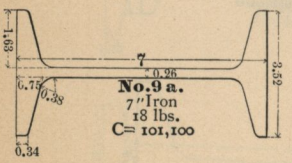
No. 13 b.
3" Iron
9 lbs.
C= 18,900.



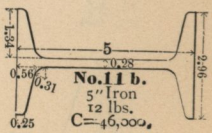
No. 8 c.
8" Iron
35 lbs.
C= 224,000



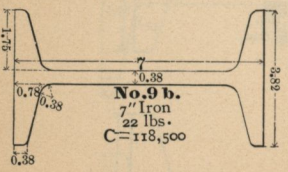
No. 12.
4" Iron
7 lbs.
C= 22,800.



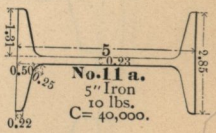
No. 9 a.
7" Iron
18 lbs.
C= 101,100



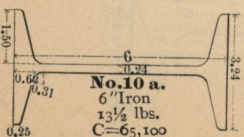
No. 11 b.
5" Iron
12 lbs.
C= 46,000.



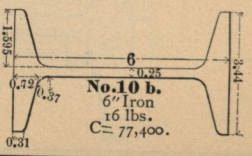
No. 9 b.
7" Iron
22 lbs.
C= 118,500



No. 11 a.
5" Iron
10 lbs.
C= 40,000.



No. 10 a.
6" Iron
13½ lbs.
C= 65,100



No. 10 b.
6" Iron
16 lbs.
C= 77,400.

CAST SEPARATORS FOR BEAMS.

DESIGNATION OF BEAM.	DISTANCE.		TWO BOLTS.			WEIGHT.	
	Out to Out of Flanges. In.	Between Flanges. In.	Size. In.	Cen. to Cen. In.	Length. In	Bolts and Nuts. Lbs.	Separator. Lbs.
15″ No. 1, 50 lbs.	10½	½	¾	7	7	3	17
15″ " 2, 67 "	11⅝	½	¾	7	7¾	3¼	17
12″ " 3, 42 "	9¾	½	¾	6½	6⅝	2¾	14
10½″ " 4, 31½ "	9⅝	½	¾	6	6½	2¾	11
10″ " 5, 30 "	9⅛	½	¾	5	6⅛	2¾	10
9″ " 6, 23½ "	8½	½	¾	4½	5¾	2½	9
9″ " 7, 45 "	10⅜	½	¾	4½	7¼	3	10
8″ " 8, 22 "	8⅛	½	⅝	4	5½	1½	8
7″ " 9, 18 "	7¾	½	⅝	3½	5¼	1½	7
6″ " 10, 13½ "	7	½	⅝	3	4⅞	1½	6
5″ " 11, 10 "	6	½	⅝	2½	4⅜	1½	5

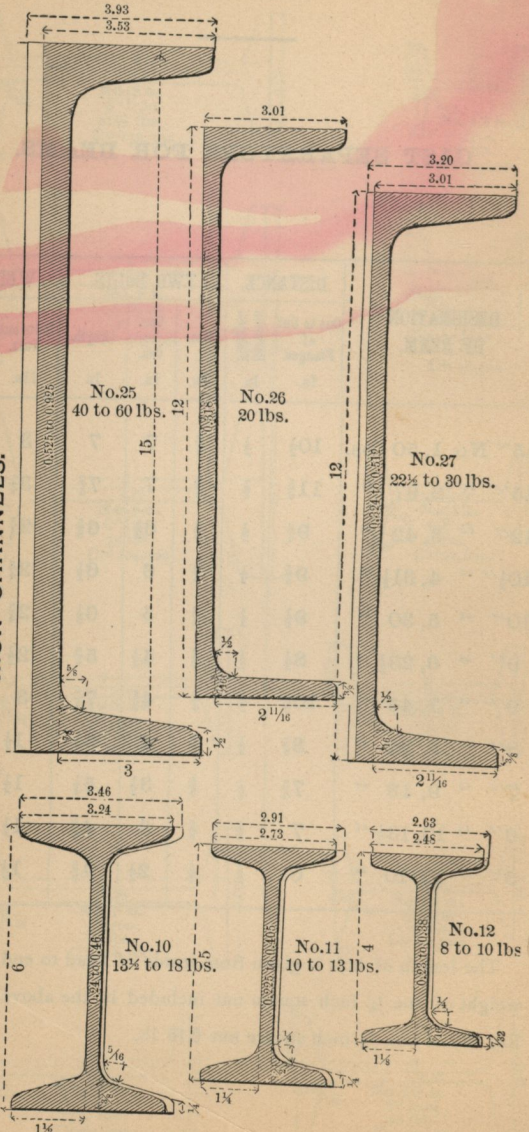
The length of bolt is given from inside of head to end. The weight of one ¾ inch square nut included in the above is 0.27 lb., and of one ⅝ inch square nut 0.15 lb.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

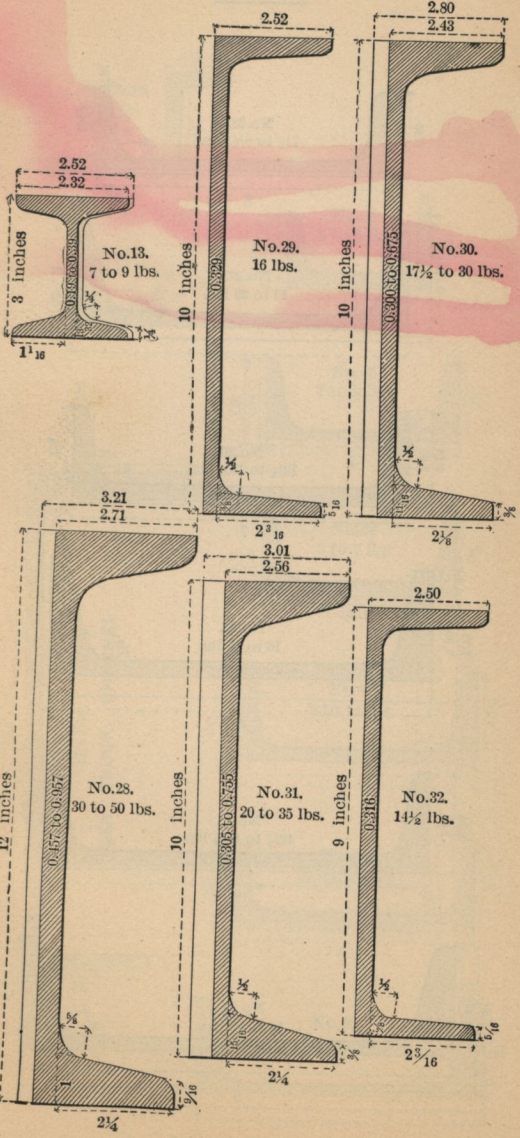
CARNEGIE SECTIONS.

IRON CHANNELS.



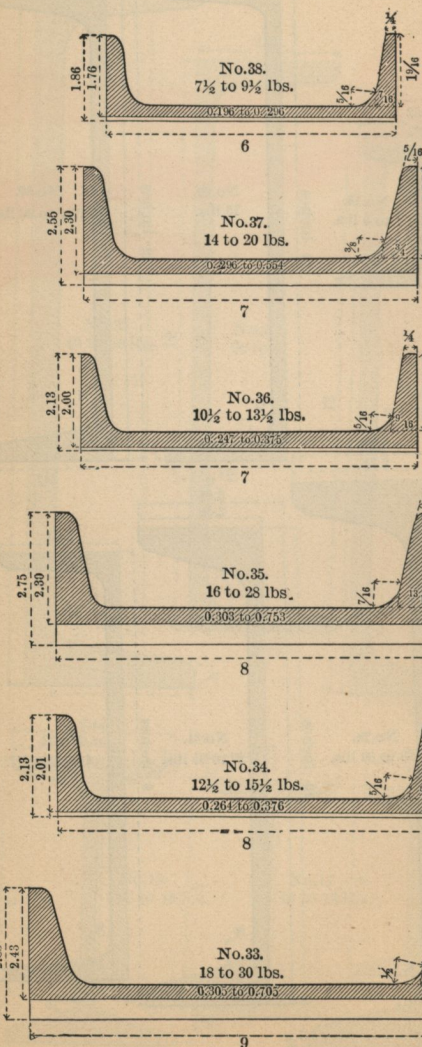
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



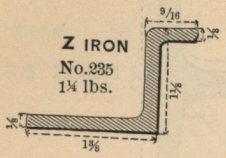
BOUTON · FOUNDRY · COMPANY,

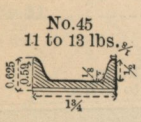
2600 Archer Avenue, Chicago.

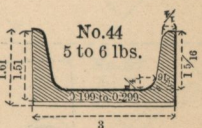


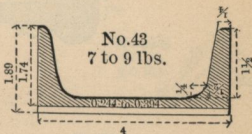
BOUTON · FOUNDRY · COMPANY,

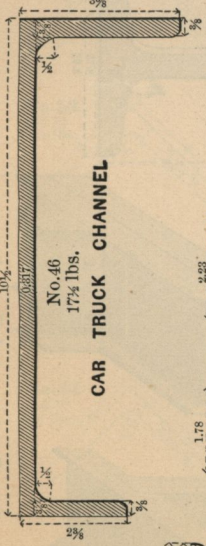
2600 Archer Avenue, Chicago.

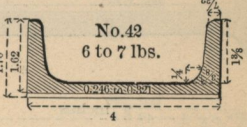


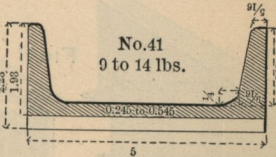


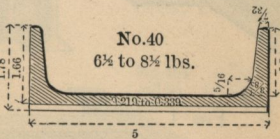


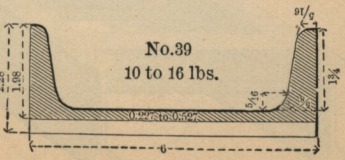






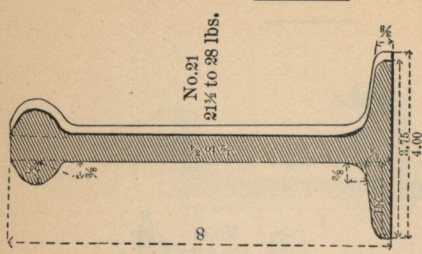




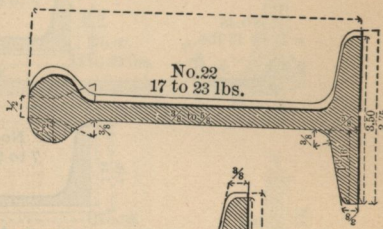


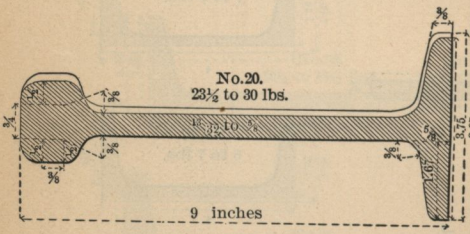
BOUTON · FOUNDRY · COMPANY,

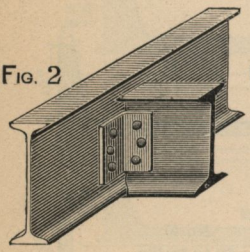
2600 Archer Avenue, Chicago.

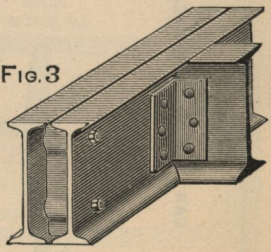


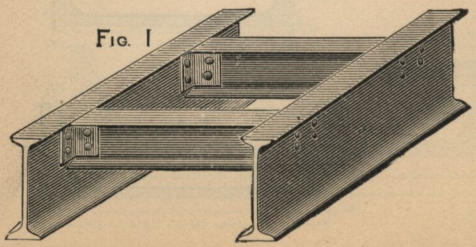
DECK BEAMS.











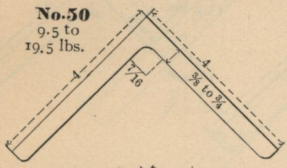
Cut showing Coping and Framing of Beams.

BOUTON · FOUNDRY · COMPANY,

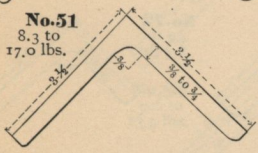
2600 Archer Avenue, Chicago.

ANGLES WITH EQUAL LEGS.

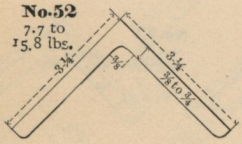
No. 50
9.5 to
19.5 lbs.



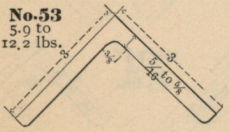
No. 51
8.3 to
17.0 lbs.



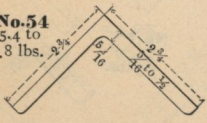
No. 52
7.7 to
15.8 lbs.



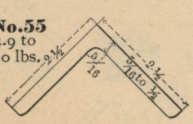
No. 53
5.9 to
12.2 lbs.



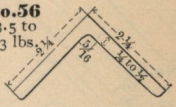
No. 54
5.4 to
8.8 lbs.



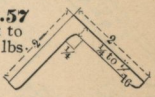
No. 55
4.9 to
8.0 lbs.



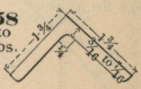
No. 56
3.5 to
7.3 lbs.



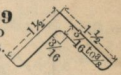
No. 57
3.1 to
5.6 lbs.



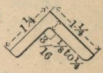
No. 58
2.1 to
5.0 lbs.



No. 59
1.8 to
3.6 lbs.



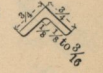
No. 60
1.0 to
2.0 lbs.



No. 61
0.9 to
1.8 lbs.

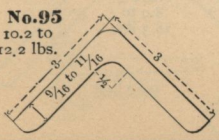
No. 62
0.8 to
1.2 lbs.

No. 63
0.6 to
0.9 lbs.

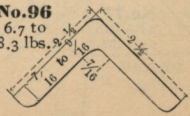


COVER ANGLES.

No. 95
10.2 to
12.2 lbs.



No. 96
6.7 to
8.3 lbs.

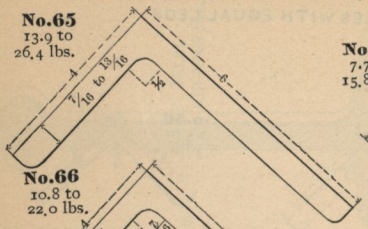


BOUTON · FOUNDRY · COMPANY,

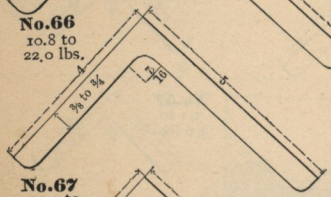
2600 Archer Avenue, Chicago.

ANGLES WITH UNEQUAL LEGS.

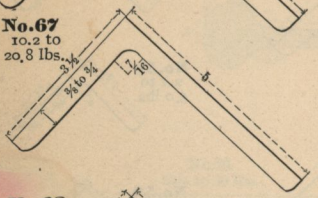
No.65
13.9 to
26.4 lbs.



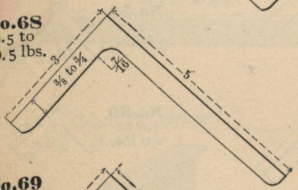
No.66
10.8 to
22.0 lbs.



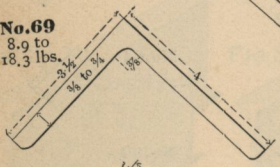
No.67
10.2 to
20.8 lbs.



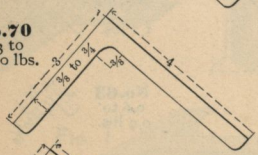
No.68
9.5 to
19.5 lbs.



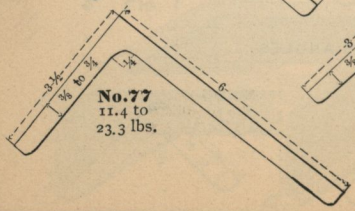
No.69
8.9 to
18.3 lbs.



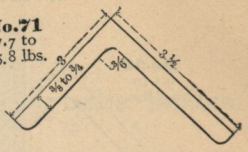
No.70
8.3 to
17.0 lbs.



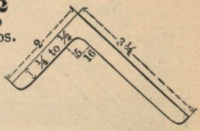
No.77
11.4 to
23.3 lbs.



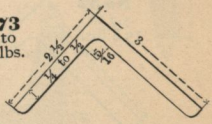
No.71
7.7 to
15.8 lbs.



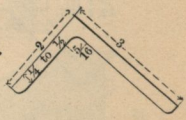
No.72
4.2 to
8.5 lbs.



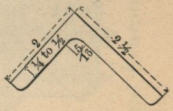
No.73
4.4 to
9.0 lbs.



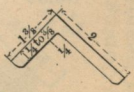
No.74
4.0 to
8.1 lbs.



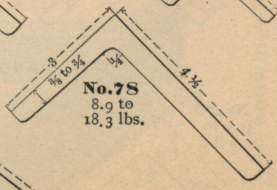
No 75
3.0 to
7.3 lbs.



No.76
2.6 to
4.0 lbs



No.78
8.9 to
18.3 lbs.

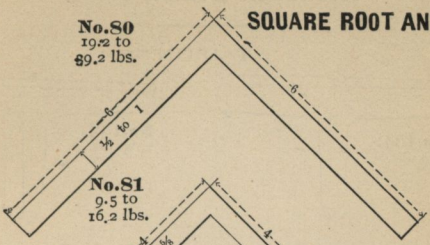


BOUTON · FOUNDRY · COMPANY,

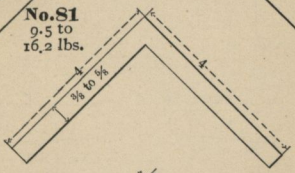
2600 Archer Avenue, Chicago.

SQUARE ROOT ANGLES.

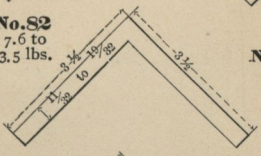
No.80
19.2 to
89.2 lbs.



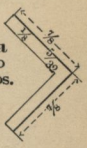
No.81
9.5 to
16.2 lbs.



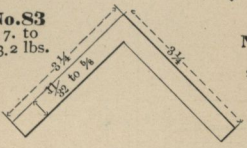
No.82
7.6 to
13.5 lbs.



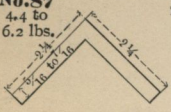
No.94 a
0.68 to
0.86 lbs.



No.83
7. to
13.2 lbs.

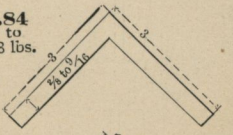


No.87
4.4 to
6.2 lbs.

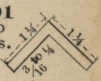


No.90
1.8 to
2.4 lbs.

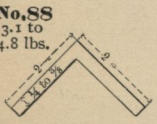
No.84
7. to
10.8 lbs.



No.91
1.5 to
2. lbs.

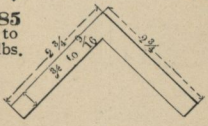


No.88
3.1 to
4.8 lbs.

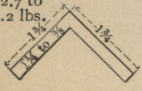


No.92
1.3 to
1.8 lbs.

No.85
6.4 to
9.8 lbs.

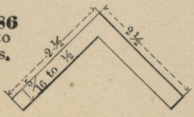


No.89
2.7 to
4.2 lbs.

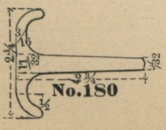


No.93
1. to
1.2 lbs.

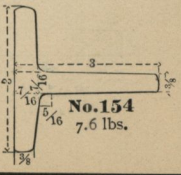
No.86
4.9 to
8 lbs.



No.94
0.9 lbs.
(NEW)



No.180

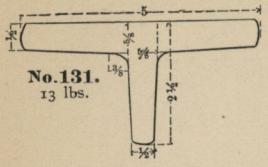


No.154
7.6 lbs.

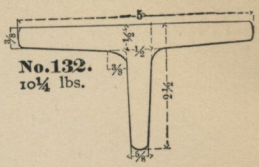
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

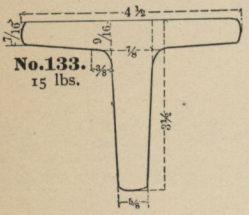
T IRON.



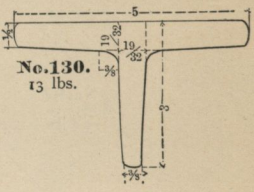
No.131.
13 lbs.



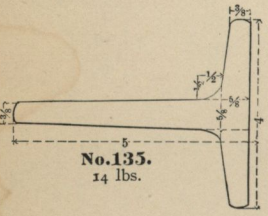
No.132.
10¼ lbs.



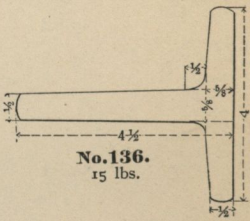
No.133.
15 lbs.



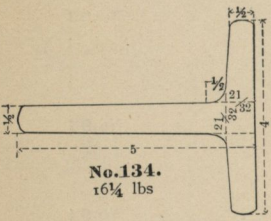
No.130.
13 lbs.



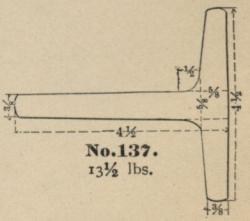
No.135.
14 lbs.



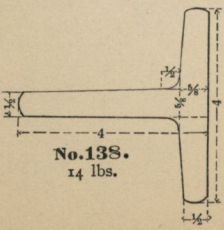
No.136.
15 lbs.



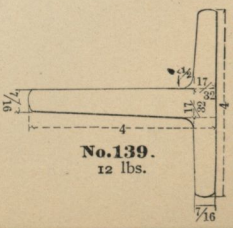
No.134.
16¼ lbs



No.137.
13½ lbs.



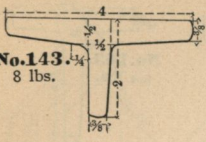
No.138.
14 lbs.



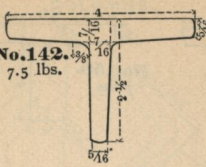
No.139.
12 lbs.

BOUTON · FOUNDRY · COMPANY,

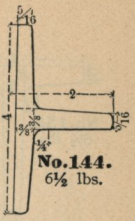
2600 Archer Avenue, Chicago.



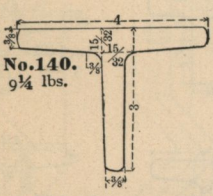
No.143.
8 lbs.



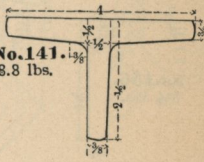
No.142.
7.5 lbs.



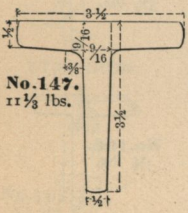
No.144.
6½ lbs.



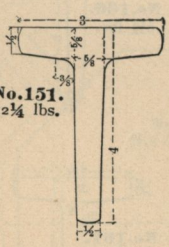
No.140.
9¼ lbs.



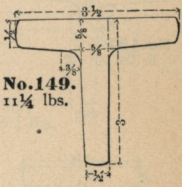
No.141.
8.8 lbs.



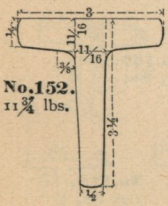
No.147.
11⅓ lbs.



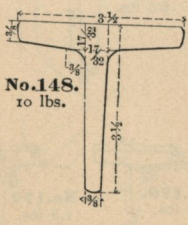
No.151.
12¼ lbs.



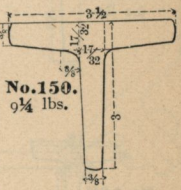
No.149.
11¼ lbs.



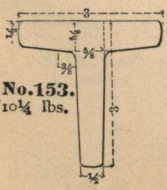
No.152.
11⅞ lbs.



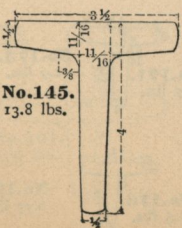
No.148.
10 lbs.



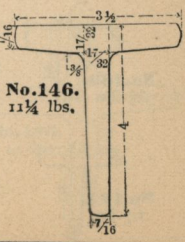
No.150.
9¼ lbs.



No.153.
10¼ lbs.



No.145.
13.8 lbs.



No.146.
11¼ lbs.

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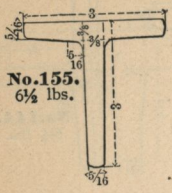
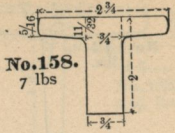
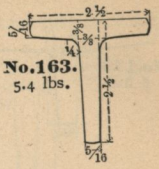


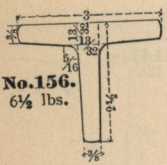
No.155.
6½ lbs.



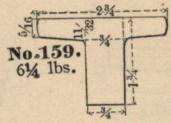
No.158.
7 lbs



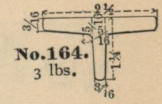
No.163.
5.4 lbs.



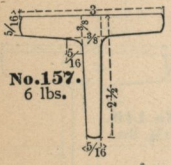
No.156.
6½ lbs.



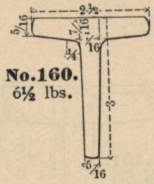
No.159.
6¼ lbs.



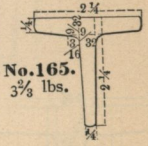
No.164.
3 lbs.



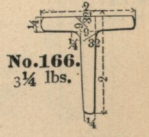
No.157.
6 lbs.



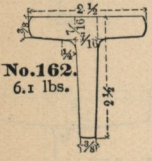
No.160.
6½ lbs.



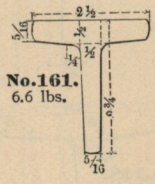
No.165.
3⅜ lbs.



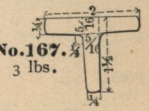
No.166.
3¼ lbs.



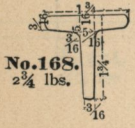
No.162.
6.1 lbs.



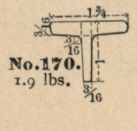
No.161.
6.6 lbs.



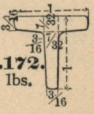
No.167.¼
3 lbs.



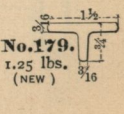
No.168.
2¾ lbs.



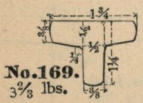
No.170.
1.9 lbs.



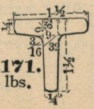
No.172.
1.8 lbs.



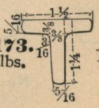
No.179.
1.25 lbs.
(NEW)



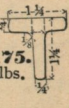
No.169.
3⅔ lbs.



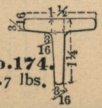
No.171.
2.5 lbs.



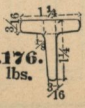
No.173.
2.9 lbs.



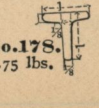
No.175.
1.9 lbs.



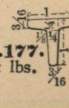
No.174.
1.7 lbs.



No.176.
1.5 lbs.



No.178.
0.75 lbs.

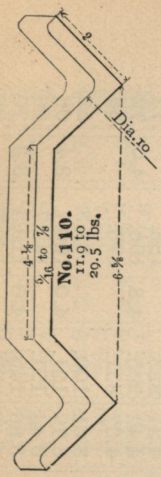


No.177.
1.1 lbs.

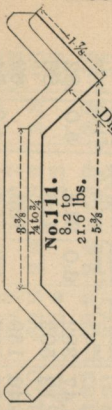
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

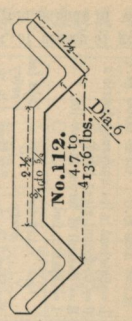
KEYSTONE OCTAGON COLUMNS.



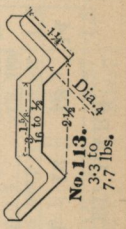
No. 110.
11.9 to 20.5 lbs.



No. 111.
8.2 to 21.6 lbs.

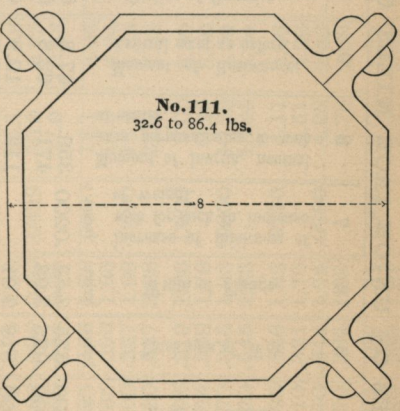


No. 112.
4.7 to 4 13/16 lbs.

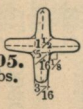


No. 113.
3.3 to 7.7 lbs.

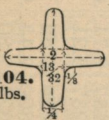
STAR IRON.



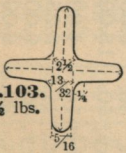
No. 111.
32.6 to 86.4 lbs.



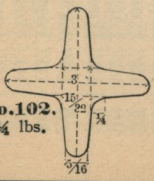
No. 105.
2.3 lbs.



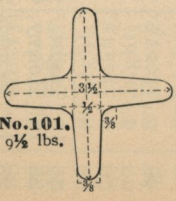
No. 104.
3¾ lbs.



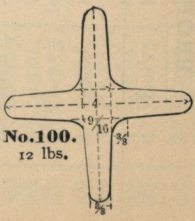
No. 103.
5½ lbs.



No. 102.
7¼ lbs.



No. 101.
9½ lbs.



No. 100.
12 lbs.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

PROPERTIES OF UNION IRON MILLS' CHANNEL BARS.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of Shape.	Designation.	Weight per foot.	Area of Section.	Thickness of Web	Width of Flange.	Increase of thickness of web for each lb. increase of weight.	Moment of Inertia, neutral axis perpendicular to web at center.	Moment of Resistance, neutral axis as before.	Radius of Gyration, neutral axis as before.	$L = \frac{1000\ C.}{l}$ $M = 125\ C.$ $C = \frac{1L.}{1000}$ $C = .008\ M.$ L = Safe load in lbs. uniformly distrib'd. C = Coefficient given below. M = Moment of forces, in foot-lbs. l = Span in feet.				Dist. of center of gravity from outside of web.
										C For fiber strain of 12000 lbs. per sq. in.	Add for every lb. increase of weight of beam	C For fiber strain of 10000 lbs. per sq. in.	Add for every lb. increase of weight of beam	
		Lbs.	Sq. in.	Inches.	Inches.	Inches.								Inches.
25	15″ Light,	40.	12.00	.525	3.53	.0200	359.	47.8	5.47	382.	6.0	319.	5.0	.82
25	15″ Heavy,	60.	18.00	.925	3.93		471.	62.8	5.12	502.		419.		.88
26	12″ One weight	20.	6.00	.318	3.01		119.	19.9	4.46	159.	4.8	133.	4.0	.69
27	12″ Light,	22.5	6.75	.324	3.01	.0250	140.	23.4	4.56	187.		156.		.74
27	12″ Heavy,	30.	9.00	.512	3.20		168.	27.9	4.31	223.		186.		.72
28	12″ Light,	30.	9.00	.457	2.71	.0250	176.	29.4	4.42	235.	4.8	196.	4.0	.72
28	12″ Heavy,	50.	15.00	.957	3.21		248.	41.4	4.07	331.		276.		.83
29	10″ One weight	16.	4.80	.329	2.52		62.5	12.5	3.61	100.		83.3		.55
30	10″ Light,	17.5	5.25	.300	2.43	.0300	75.5	15.1	3.79	121.	4.0	100.7	3.4	.63
30	10″ Heavy,	30.	9.00	.675	2.80		106.8	21.4	3.44	171.		142.7		.66
31	10″ Light,	20.	6.00	.305	2.56	.0300	89.4	17.9	3.86	143.	4.0	119.3	3.3	.70
31	10″ Heavy,	35.	10.50	.755	3.01		126.9	25.4	3.48	203.		169.3		.65

32	9″ One weight	14.5	4.35	.316	2.50		47.4	10.5	3.30	84.0		70.0		.58
33	9″ Light,	18.	5.40	.305	2.43	.0333	64.8	14.4	3.46	115.2	3.6	96.0	3.0	.68
33	9″ Heavy,	30.	9.00	.705	2.83		89.1	19.8	3.15	158.4		132.0		.73
34	8″ Light,	12.5	3.75	.264	2.01	.0375	34.5	8.61	3.03	68.9	3.2	57.4	2.7	.53
34	8″ Heavy,	15.5	4.65	.376	2.13		39.2	9.81	2.90	78.5		65.4		.53
35	8″ Light,	16.	4.80	.303	2.30	.0375	45.3	11.34	3.07	90.4	3.2	75.6	2.6	.66
35	8″ Heavy,	28.	8.40	.753	2.75		64.5	16.14	2.77	129.1		107.6		.73
36	7″ Light,	10.5	3.15	.247	2.00	.0429	22.4	6.41	2.67	51.3	2.8	42.7	2.3	.52
36	7″ Heavy,	13.5	4.05	.375	2.13		26.1	7.46	2.54	59.7		49.7		.52
37	7″ Light,	14.	4.20	.296	2.30	.0429	30.6	8.73	2.70	69.8	2.8	58.2	2.3	.66
37	7″ Heavy,	20.	6.00	.554	2.55		37.9	10.83	2.51	86.4		72.2		.68
38	6″ Light,	7.5	2.25	.196	1.76	.0500	12.1	4.04	2.32	32.3	2.4	26.9	2.0	.48
38	6″ Heavy,	9.5	2.85	.296	1.86		13.9	4.64	2.21	37.1		30.9		.47
39	6″ Light,	10.	3.00	.227	1.98	.0500	16.6	5.53	2.35	44.2	2.4	36.9	2.0	.60
39	6″ Heavy,	16.	4.80	.527	2.28		22.0	7.33	2.14	58.6		48.9		.62
40	5″ Light,	6.5	1.95	.219	1.66	.0600	7.00	2.80	1.90	22.4	2.0	18.7	1.7	.44
40	5″ Heavy,	8.5	2.55	.339	1.78		8.25	3.30	1.80	26.4		22.0		.44
41	5″ Light,	9.	2.70	.245	1.93	.0600	10.22	4.09	1.94	32.7	2.0	27.3	1.7	.61
41	5″ Heavy,	14.	4.20	.545	2.23		13.35	5.34	1.78	42.7		35.6		.64
42	4″ Light,	6.	1.80	.246	1.62	.0750	4.11	2.06	1.51	16.5	1.6	13.7	1.4	.46
42	4″ Heavy,	7.	2.10	.321	1.70		4.51	2.26	1.47	18.1		15.1		.46
43	4″ Light,	7.	2.10	.244	1.74	.0750	4.98	2.49	1.54	19.9	1.6	16.6	1.4	.54
43	4″ Heavy,	9.	2.70	.394	1.89		5.78	2.89	1.46	23.1		19.3		.56
44	3″ Light,	5.	1.50	.199	1.51	.1000	2.04	1.33	1.17	10.6	1.5	8.87	1.2	.51
44	3″ Heavy,	6.	1.80	.299	1.61		2.27	1.51	1.12	12.1		10.07		.52

PROPERTIES OF UNION IRON MILLS' ANGLE IRONS OF MINIMUM AND MAXIMUM THICKNESSES AND WEIGHTS.

ANGLES WITH EQUAL LEGS.

Size. Inches.	Thickness. Inches.	Weight per Foot. Lbs.	Area. Square Inches.	Dist. of center of gravity from outside of flange. Inches.	Moment of Inertia, neutral axis through center of gravity parallel to flange.	Moment of Resistance, neutral axis as before.	Radius of Gyration, neutral axis as before. Inches.
	Min. Max.	Min. Max.	Min. Max.	Min. Max.	Min. Max.	Min. Max.	Min. Max.
6 × 6	1/2—1	19.2-39.2	5.75-11.75	1.68-1.96	19.9 -43.1	4.6 -9.5	1.9 -1.9
4 × 4	3/8—3/4	9.5-19.5	2.86- 5.86	1.14-1.35	4.36 - 9.55	1.5 -3.2	1.2 -1.3
3 1/2 × 3 1/2	3/8—3/4	8.3-17.0	2.48- 5.11	1.01-1.22	2.87 - 6.38	1.2 -2.4	1.1 -1.1
3 1/4 × 3 1/4	3/8—3/4	7.7-15.8	2.30- 4.73	0.95-1.16	2.27 - 5.10	0.99-2.1	0.99-1.0
3 × 3	5/16—5/8	5.9-12.2	1.78- 3.65	0.86-1.04	1.51 - 3.35	0.71-1.5	0.92-0.96
2 3/4 × 2 3/4	5/16—1/2	5.4- 8.8	1.62- 2.65	0.80-0.91	1.15 - 1.99	0.59-0.98	0.84-0.87
2 1/2 × 2 1/2	5/16—1/2	4.9- 8.0	1.46- 2.39	0.74-0.85	0.85 - 1.49	0.48-0.81	0.76-0.79
2 1/4 × 2 1/4	1/4—1/2	3.5- 7.3	1.06- 2.19	0.66-0.79	0.50 - 1.13	0.32-0.66	0.69-0.72
2 × 2	1/4—7/16	3.1- 5.6	0.94- 1.69	0.59-0.70	0.35 - 0.68	0.25-0.45	0.61-0.63
1 3/4 × 1 3/4	3/16—7/16	2.1- 5.0	0.62- 1.50	0.51-0.64	0.18 - 0.48	0.14-0.35	0.54-0.56
1 1/2 × 1 1/2	3/16—3/8	1.8- 3.6	0.53- 1.09	0.44-0.55	0.11 - 0.25	0.10-0.22	0.46-0.48
1 1/4 × 1 1/4	1/8—1/4	1.0- 2.0	0.30- 0.61	0.35-0.43	0.044- 0.098	0.05-0.10	0.38-0.40
1 1/8 × 1 1/8	1/8—1/4	0.9- 1.8	0.27- 0.53	0.32-0.39	0.032- 0.071	0.04 -0.08	0.34-0.36
1 × 1	1/8—3/16	0.8- 1.2	0.23- 0.36	0.30-0.33	0.022- 0.035	0.05-0.05	0.30-0.31

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6 × 4	7/16—13/16	13.9–26.4	4.18–7.93	1.96–2.17 0.96–1.17	15.5 –30.7 5.61–11.5	3.8 –7.3 1.8 –3.6	1.9 –2.0 1.2 –1.2
5 × 4	3/8—3/4	10.8–22.0	3.23–6.61	1.53–1.74 1.03–1.24	8.16–17.5 4.67–10.3	2.4 –4.8 1.6 –3.3	1.6 –1.6 1.2 –1.2
5 × 3½	3/8—3/4	10.2–20.8	3.05–6.23	1.61–1.82 0.86–1.07	7.78–16.7 3.18– 7.09	2.3 –4.7 1.2 –2.5	1.6 –1.6 1.0 –1.1
5 × 3	3/8—3/4	9.5–19.5	2.86–5.86	1.70–1.91 0.70–0.91	7.37–15.87 2.04– 4.66	2.2 –4.6 0.89–1.9	1.6 –1.6 0.84–0.89
4 × 3½	3/8—3/4	8.9–18.3	2.67–5.48	1.20–1.41 0.96–1.16	4.18– 9.14 2.99– 6.65	1.49–3.1 1.18–2.5	1.25–1.29 1.06–1.10
4 × 3	3/8—3/4	8.3–17.0	2.48–5.11	1.28–1.49 0.78–0.99	3.96– 8.70 1.92– 4.38	1.46–3.0 0.87–1.8	1.26–1.30 0.88–0.93
3½ × 3	3/8—3/4	7.7–15.8	2.30–4.73	1.08–1.29 0.83–1.04	2.72– 6.07 1.85– 4.21	1.13–2.4 0.85–1.8	1.09–1.13 0.90–0.94
3¼ × 2	¼—½	4.2– 8.5	1.25–2.56	1.10–1.24 0.48–0.61	1.36– 2.93 0.40– 0.91	0.63–1.3 0.26–0.56	1.04–1.07 0.57–0.60
3 × 2½	¼—½	4.4– 9.0	1.31–2.69	0.91–1.05 0.66–0.80	1.17– 2.54 0.74– 1.64	0.56–1.15 0.40–0.84	0.94–0.97 0.75–0.78
3 × 2	¼—½	4.0– 8.1	1.19–2.44	0.99–1.13 0.49–0.63	1.09– 2.36 0.39– 0.89	0.54–1.11 0.26–0.55	0.96–0.99 0.57–0.60
2½ × 2	¼—½	3.5– 7.3	1.06–2.19	0.79–0.92 0.54–0.67	0.65– 1.44 0.37– 0.85	0.38–0.79 0.25–0.54	0.78–0.81 0.59–0.62
2 × 1⅜	¼—⅜	2.6– 4.0	0.78–1.20	0.69–0.76 0.37–0.44	0.31– 0.50 0.12– 0.20	0.23–0.36 0.12–0.20	0.63–0.65 0.39–0.41

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UNION IRON MILLS' ANGLE IRONS.

Weights per Foot corresponding to thicknesses varying by $\frac{1}{16}$".

One cubic foot weighing 480 lbs.

Size. Inches.	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"
Equal Legs.													
6 ×6	..	..	..	..	..	..	19.2	21.7	24.2	26.7	29.2	31.7	34.2
4 ×4	..	..	..	..	9.5	11.2	12.9	14.5	16.2	17.9	19.5	..	..
3½ ×3½	..	..	..	..	8.3	9.7	11.2	12.7	14.1	15.6	17.0	..	..
3¼ ×3¼	..	..	..	..	7.7	9.0	10.4	11.7	13.1	14.4	15.8	..	..
3 ×3	..	..	..	5.9	7.2	8.4	9.7	10.9	12.2	..	..	..	..
2¾ ×2¾	..	..	..	5.4	6.5	7.7	8.8	..	..	..	..	..	..
2½ ×2½	..	..	..	4.9	5.9	7.0	8.0	..	..	..	..	..	..
2¼ ×2¼	..	..	3.5	4.5	5.4	6.4	7.3	..	..	..	..	..	..
2 ×2	..	..	3.1	4.0	4.8	5.6	..	..	..	..	..	..	..
1¾ ×1¾	..	2.1	2.8	3.5	4.3	5.0	..	..	..	..	..	..	..
1½ ×1½	..	1.8	2.4	3.0	3.6	..	..	..	..	..	..	..	..
1¼ ×1¼	1.0	1.5	2.0	..	..	..	..	..	..	..	..	..	..
1⅛ ×1⅛	0.9	1.4	1.8	..	..	..	..	..	..	..	..	..	..
1 ×1	0.8	1.2	1.6	..	..	..	..	..	..	..	..	..	..
¾ × ¾	0.6	0.9	..	..	..	..	..	..	..	..	..	..	..
Inequal Legs													
6 ×4	..	..	..	..	..	13.9	16.0	18.1	20.2	22.3	24.4	26.4	..
5 ×4	..	..	..	..	10.8	12.7	14.5	16.4	18.3	20.2	22.0	..	..
5 ×3½	..	..	..	..	10.2	11.9	13.7	15.5	17.2	19.0	20.8	..	..
5 ×3	..	..	..	..	9.5	11.2	12.9	14.5	16.2	17.9	19.5	..	..
4 ×3½	..	..	..	..	8.9	10.5	12.0	13.6	15.2	16.7	18.3	..	..
4 ×3	..	..	..	..	8.3	9.7	11.2	12.7	14.1	15.6	17.0	..	..
3½ ×3	..	..	..	..	7.7	9.0	10.4	11.7	13.1	14.4	15.8	..	..
3¼ ×2	..	..	4.2	5.3	6.4	7.4	8.5	..	..	..	..	..	..
3 ×2½	..	..	4.4	5.5	6.7	7.8	9.0	..	..	..	..	..	..
3 ×2	..	..	4.0	5.0	6.0	7.1	8.1	..	..	..	..	..	..
2½ ×2	..	..	3.5	4.5	5.4	6.4	7.3	..	..	..	..	..	..
2 ×1⅜	..	..	2.6	3.3	4.0	..	..	..	..	..	..	..	..

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PROPERTIES OF UNION IRON MILLS' T IRONS.

The moments of inertia and resistance and radii of gyration in this table, are close approximations only.
The table does not include all sizes manufactured.

Size, Flange by Stem. Inches.	Weight per Foot. Lbs.	Area of Section. Square Inches.	Distance of Center of Gravity from Top. Inches.	Moment of Inertia, neutral axis thro' center of gravity parallel to flange.	Least Moment of Resistance, neutral axis as before.	Radius of Gyration, neutral axis as before.	Moment of Inertia, neutral axis thro' center of gravity coincident with stem.	Least Moment of Resistance, neutral axis as before.	Radius of Gyration, neutral axis as before.
5 ×3	13	3.90	0.73	2.5	1.1	0.80	5.7	2.3	1.21
5 ×2½	10¼	3.08	0.58	1.4	0.71	0.66	4.6	1.8	1.21
4½ ×3½	15	4.50	1.13	5.2	2.18	1.07	3.9	1.7	0.93
4 ×5	14	4.20	1.57	10.5	3.05	1.57	2.7	1.4	0.80
4 ×4½	13½	4.05	1.37	7.8	2.48	1.39	2.7	1.4	0.82
4 ×4	12	3.60	1.18	5.4	1.91	1.22	2.6	1.3	0.84
4 ×3	9¼	2.78	0.80	2.1	0.96	0.87	2.3	1.1	0.90
4 ×2½	7½	2.25	0.62	1.1	0.60	0.70	2.0	1.0	0.93
4 ×2	6½	1.95	0.46	0.54	0.35	0.53	1.8	0.91	0.96
3½ ×4	11¼	3.38	1.24	5.15	1.87	1.23	1.8	1.00	0.72
3½ ×3½	10	3.00	1.04	3.34	1.36	1.05	1.6	0.93	0.73
3½ ×3	9¼	2.78	0.85	2.14	1.00	0.88	1.6	0.93	0.77
3 ×4	12¼	3.68	1.35	5.55	2.10	1.24	1.3	0.87	0.60
3 ×3½	11¾	3.53	1.15	3.93	1.67	1.06	1.4	0.92	0.62
3 ×3	7.6	2.28	0.90	1.89	0.90	0.91	0.94	0.63	0.64
3 ×2½	6	1.80	0.69	0.96	0.53	0.73	0.77	0.51	0.66
2½ ×3	6½	1.95	0.96	1.66	0.81	0.93	0.50	0.40	0.51
2½ ×2¾	6.6	1.98	0.86	1.39	0.74	0.84	0.55	0.44	0.53
2½ ×2½	5.4	1.62	0.75	0.91	0.43	0.75	0.46	0.37	0.53
2½ ×1¼	3	0.90	0.30	0.09	0.10	0.32	0.33	0.26	0.61

PROPERTIES OF UNION IRON MILLS' STAR · IRONS.

Size. Inches.	Weight per Foot. Lbs.	Thickness in Inches at End and Root of Flange.	Area. Sq. In.	Moment of Inertia, neutral axis thro' center of gravity.	Moment of Resistance, neutral axis as before.	Radius of Gyration, neutral axis as before.
4 ×4	12	$\frac{3}{4}$ — $\frac{9}{16}$	3.60	2.32	1.16	0.81
3½ ×3½	9½	$\frac{7}{8}$ — $\frac{1}{2}$	2.85	1.49	0.85	0.72
3 ×3	7¼	$\frac{5}{16}$ — $\frac{15}{32}$	2.18	0.82	0.55	0.61
2½ ×2½	5½	$\frac{5}{16}$ — $\frac{13}{32}$	1.65	0.45	0.36	0.52
2 ×2	3¾	$\frac{1}{4}$ — $\frac{13}{32}$	1.13	0.20	0.20	0.43
1½ ×1½	2.3	$\frac{3}{16}$ — $\frac{5}{16}$	0.69	0.065	0.087	0.31

WEIGHTS OF FLAT ROLLED IRON PER LINEAL FOOT.

For Thicknesses from $\frac{1}{16}$ in. to 2 in. and Widths from 1 in. to 12¾ in.

Iron weighing 480 lbs. per cubic foot.

Thickness in Inches.	1″	1¼″	1½″	1¾″	2″	2¼″	2½″	2¾″	12″
$\frac{1}{16}$	.208	.260	.313	.365	.417	.469	.521	.573	2.50
$\frac{1}{8}$	.417	.521	.625	.729	.833	.938	1.04	1.15	5.00
$\frac{3}{16}$	.625	.781	.938	1.09	1.25	1.41	1.56	1.72	7.50
$\frac{1}{4}$	.833	1.04	1.25	1.46	1.67	1.88	2.08	2.29	10.00
$\frac{5}{16}$	1.04	1.30	1.56	1.82	2.08	2.34	2.60	2.86	12.50
$\frac{3}{8}$	1.25	1.56	1.88	2.19	2.50	2.81	3.13	3.44	15.00
$\frac{7}{16}$	1.46	1.82	2.19	2.55	2.92	3.28	3.65	4.01	17.50
$\frac{1}{2}$	1.67	2.08	2.50	2.92	3.33	3.75	4.17	4.58	20.00
$\frac{9}{16}$	1.88	2.34	2.81	3.28	3.75	4.22	4.69	5.16	22.50
$\frac{5}{8}$	2.08	2.60	3.13	3.65	4.17	4.69	5.21	5.73	25.00
$\frac{11}{16}$	2.29	2.86	3.44	4.01	4.58	5.16	5.73	6.30	27.50
$\frac{3}{4}$	2.50	3.13	3.75	4.38	5.00	5.63	6.25	6.88	30.00
$\frac{13}{16}$	2.71	3.39	4.06	4.74	5.42	6.09	6.77	7.45	32.50
$\frac{7}{8}$	2.92	3.65	4.38	5.10	5.83	6.56	7.29	8.02	35.00
$\frac{15}{16}$	3.13	3.91	4.69	5.47	6.25	7.03	7.81	8.59	37.50
1	3.33	4.17	5.00	5.83	6.67	7.50	8.33	9.17	40.00
$1\frac{1}{16}$	3.54	4.43	5.31	6.20	7.08	7.97	8.85	9.74	42.50
$1\frac{1}{8}$	3.75	4.69	5.63	6.56	7.50	8.44	9.38	10.31	45.00
$1\frac{3}{16}$	3.96	4.95	5.94	6.93	7.92	8.91	9.90	10.89	47.50
$1\frac{1}{4}$	4.17	5.21	6.25	7.29	8.33	9.38	10.42	11.46	50.00
$1\frac{5}{16}$	4.37	5.47	6.56	7.66	8.75	9.84	10.94	12.03	52.50
$1\frac{3}{8}$	4.58	5.73	6.88	8.02	9.17	10.31	11.46	12.60	55.00
$1\frac{7}{16}$	4.79	5.99	7.19	8.39	9.58	10.78	11.98	13.18	57.50
$1\frac{1}{2}$	5.00	6.25	7.50	8.75	10.00	11.25	12.50	13.75	60.00
$1\frac{9}{16}$	5.21	6.51	7.81	9.11	10.42	11.72	13.02	14.32	62.50
$1\frac{5}{8}$	5.42	6.77	8.13	9.48	10.83	12.19	13.54	14.90	65.00
$1\frac{11}{16}$	5.63	7.03	8.44	9.84	11.25	12.66	14.06	15.47	67.50
$1\frac{3}{4}$	5.83	7.29	8.75	10.21	11.67	13.13	14.58	16.04	70.00
$1\frac{13}{16}$	6.04	7.55	9.06	10.57	12.08	13.59	15.10	16.61	72.50
$1\frac{7}{8}$	6.25	7.81	9.38	10.94	12.50	14.06	15.63	17.19	75.00
$1\frac{15}{16}$	6.46	8.07	9.69	11.30	12.92	14.53	16.15	17.76	77.50
2	6.67	8.33	10.00	11.67	13.33	15.00	16.67	18.33	80.00

WEIGHTS OF FLAT ROLLED IRON PER LINEAL FOOT.

(CONTINUED.)

Thickness in Inches.	3″	3¼″	3½″	3¾″	4″	4¼″	4½″	4¾″	12″
1/16	.625	.677	.729	.781	.833	.885	.938	.990	2.50
1/8	1.25	1.35	1.46	1.56	1.67	1.77	1.88	1.98	5.00
3/16	1.88	2.03	2.19	2.34	2.50	2.66	2.81	2.97	7.50
1/4	2.50	2.71	2.92	3.13	3.33	3.54	3.75	3.96	10.00
5/16	3.13	3.39	3.65	3.91	4.17	4.43	4.69	4.95	12.50
3/8	3.75	4.06	4.38	4.69	5.00	5.31	5.63	5.94	15.00
7/16	4.38	4.74	5.10	5.47	5.83	6.20	6.56	6.93	17.50
1/2	5.00	5.42	5.83	6.25	6.67	7.08	7.50	7.92	20.00
9/16	5.63	6.09	6.56	7.03	7.50	7.97	8.44	8.91	22.50
5/8	6.25	6.77	7.29	7.81	8.33	8.85	9.38	9.90	25.00
11/16	6.88	7.45	8.02	8.59	9.17	9.74	10.31	10.89	27.50
3/4	7.50	8.13	8.75	9.38	10.00	10.63	11.25	11.88	30.00
13/16	8.13	8.80	9.48	10.16	10.83	11.51	12.19	12.86	32.50
7/8	8.75	9.48	10.21	10.94	11.67	12.40	13.13	13.85	35.00
15/16	9.38	10.16	10.94	11.72	12.50	13.28	14.06	14.84	37.50
1	10.00	10.83	11.67	12.50	13.33	14.17	15.00	15.83	40.00
1 1/16	10.63	11.51	12.40	13.28	14.17	15.05	15.94	16.82	42.50
1 1/8	11.25	12.19	13.13	14.06	15.00	15.94	16.88	17.81	45.00
1 3/16	11.88	12.86	13.85	14.84	15.83	16.82	17.81	18.80	47.50
1 1/4	12.50	13.54	14.58	15.63	16.67	17.71	18.75	19.79	50.00
1 5/16	13.13	14.22	15.31	16.41	17.50	18.59	19.69	20.78	52.50
1 3/8	13.75	14.90	16.04	17.19	18.33	19.48	20.63	21.77	55.00
1 7/16	14.38	15.57	16.77	17.97	19.17	20.36	21.56	22.76	57.50
1 1/2	15.00	16.25	17.50	18.75	20.00	21.25	22.50	23.75	60.00
1 9/16	15.63	16.93	18.23	19.53	20.83	22.14	23.44	24.74	62.50
1 5/8	16.25	17.60	18.96	20.31	21.67	23.02	24.38	25.73	65.00
1 11/16	16.88	18.28	19.69	21.09	22.50	23.91	25.31	26.72	67.50
1 3/4	17.50	18.96	20.42	21.88	23.33	24.79	26.25	27.71	70.00
1 13/16	18.13	19.64	21.15	22.66	24.17	25.68	27.19	28.70	72.50
1 7/8	18.75	20.31	21.88	23.44	25.00	26.56	28.13	29.69	75.00
1 15/16	19.38	20.99	22.60	24.22	25.83	27.45	29.06	30.68	77.50
2	20.00	21.67	23.33	25.00	26.67	28.33	30.00	31.67	80.00

WEIGHTS OF FLAT ROLLED IRON PER LINEAL FOOT.

(CONTINUED.)

Thickness in Inches.	5″	5¼″	5½″	5¾″	6″	6¼″	6½″	6¾″	12″
1/16	1.04	1.09	1.15	1.20	1.25	1.30	1.35	1.41	2.50
1/8	2.08	2.19	2.29	2.40	2.50	2.60	2.71	2.81	5.00
3/16	3.13	3.28	3.44	3.59	3.75	3.91	4.06	4.22	7.50
1/4	4.17	4.38	4.58	4.79	5.00	5.21	5.42	5.63	10.00
5/16	5.21	5.47	5.73	5.99	6.25	6.51	6.77	7.03	12.50
3/8	6.25	6.56	6.88	7.19	7.50	7.81	8.13	8.44	15.00
7/16	7.29	7.66	8.02	8.39	8.75	9.11	9.48	9.84	17.50
1/2	8.33	8.75	9.17	9.58	10.00	10.42	10.83	11.25	20.00
9/16	9.38	9.84	10.31	10.78	11.25	11.72	12.19	12.66	22.50
5/8	10.42	10.94	11.46	11.98	12.50	13.02	13.54	14.06	25.00
11/16	11.46	12.03	12.60	13.18	13.75	14.32	14.90	15.47	27.50
3/4	12.50	13.13	13.75	14.38	15.00	15.63	16.25	16.88	30.00
13/16	13.54	14.22	14.90	15.57	16.25	16.93	17.60	18.28	32.50
7/8	14.58	15.31	16.04	16.77	17.50	18.23	18.96	19.69	35.00
15/16	15.63	16.41	17.19	17.97	18.75	19.53	20.31	21.09	37.50
1	16.67	17.50	18.33	19.17	20.00	20.83	21.67	22.50	40.00
1 1/16	17.71	18.59	19.48	20.36	21.25	22.14	23.02	23.91	42.50
1 1/8	18.75	19.69	20.63	21.56	22.50	23.44	24.38	25.31	45.00
1 3/16	19.79	20.78	21.77	22.76	23.75	24.74	25.73	26.72	47.50
1 1/4	20.83	21.88	22.92	23.96	25.00	26.04	27.08	28.13	50.00
1 5/16	21.88	22.97	24.06	25.16	26.25	27.34	28.44	29.53	52.50
1 3/8	22.92	24.06	25.21	26.35	27.50	28.65	29.79	30.94	55.00
1 7/16	23.96	25.16	26.35	27.55	28.75	29.95	31.15	32.34	57.50
1 1/2	25.00	26.25	27.50	28.75	30.00	31.25	32.50	33.75	60.00
1 9/16	26.04	27.34	28.65	29.95	31.25	32.55	33.85	35.16	62.50
1 5/8	27.08	28.44	29.79	31.15	32.50	33.85	35.21	36.56	65.00
1 11/16	28.13	29.53	30.94	32.34	33.75	35.16	36.56	37.97	67.50
1 3/4	29.17	30.63	32.08	33.54	35.00	36.46	37.92	39.38	70.00
1 13/16	30.21	31.72	33.23	34.74	36.25	37.76	39.27	40.78	72.50
1 7/8	31.25	32.81	34.38	35.94	37.50	39.06	40.63	42.19	75.00
1 15/16	32.29	33.91	35.52	37.14	38.75	40.36	41.98	43.59	77.50
2	33.33	35.00	36.67	38.33	40.00	41.67	43.33	45.00	80.00

WEIGHTS OF FLAT ROLLED IRON PER LINEAL FOOT.

(CONTINUED.)

Thickness in Inches.	7″	7¼″	7½″	7¾″	8″	8¼″	8½″	8¾″	12″
1/16	1.46	1.51	1.56	1.61	1.67	1.72	1.77	1.82	2.50
1/8	2.92	3.02	3.13	3.23	3.33	3.44	3.54	3.65	5.00
3/16	4.38	4.53	4.69	4.84	5.00	5.16	5.31	5.47	7.50
1/4	5.83	6.04	6.25	6.46	6.67	6.88	7.08	7.29	10.00
5/16	7.29	7.55	7.81	8.07	8.33	8.59	8.85	9.11	12.50
3/8	8.75	9.06	9.38	9.69	10.00	10.31	10.63	10.94	15.00
7/16	10.21	10.57	10.94	11.30	11.67	12.03	12.40	12.76	17.50
1/2	11.67	12.08	12.50	12.92	13.33	13.75	14.17	14.58	20.00
9/16	13.13	13.59	14.06	14.53	15.00	15.47	15.94	16.41	22.50
5/8	14.58	15.10	15.63	16.15	16.67	17.19	17.71	18.23	25.00
11/16	16.04	16.61	17.19	17.76	18.33	18.91	19.48	20.05	27.50
3/4	17.50	18.13	18.75	19.38	20.00	20.63	21.25	21.88	30.00
13/16	18.96	19.64	20.31	20.99	21.67	22.34	23.02	23.70	32.50
7/8	20.42	21.15	21.88	22.60	23.33	24.06	24.79	25.52	35.00
15/16	21.88	22.66	23.44	24.22	25.00	25.78	26.56	27.34	37.50
1	23.33	24.17	25.00	25.83	26.67	27.50	28.33	29.17	40.00
1 1/16	24.79	25.68	26.56	27.45	28.33	29.22	30.10	30.99	42.50
1 1/8	26.25	27.19	28.13	29.06	30.00	30.94	31.88	32.81	45.00
1 3/16	27.71	28.70	29.69	30.68	31.67	32.66	33.65	34.64	47.50
1 1/4	29.17	30.21	31.25	32.29	33.33	34.38	35.42	36.46	50.00
1 5/16	30.62	31.72	32.81	33.91	35.00	36.09	37.19	38.28	52.50
1 3/8	32.08	33.23	34.38	35.52	36.67	37.81	38.96	40.10	55.00
1 7/16	33.54	34.74	35.94	37.14	38.33	39.53	40.73	41.93	57.50
1 1/2	35.00	36.25	37.50	38.75	40.00	41.25	42.50	43.75	60.00
1 9/16	36.46	37.76	39.06	40.36	41.67	42.97	44.27	45.57	62.50
1 5/8	37.92	39.27	40.63	41.98	43.33	44.69	46.04	47.40	65.00
1 11/16	39.38	40.78	42.19	43.59	45.00	46.41	47.81	49.22	67.50
1 3/4	40.83	42.29	43.75	45.21	46.67	48.13	49.58	51.04	70.00
1 13/16	42.29	43.80	45.31	46.82	48.33	49.84	51.35	52.86	72.50
1 7/8	43.75	45.31	46.88	48.44	50.00	51.56	53.13	54.69	75.00
1 15/16	45.21	46.82	48.44	50.05	51.67	53.28	54.90	56.51	77.50
2	46.67	48.33	50.00	51.67	53.33	55.00	56.67	58.33	80.00

WEIGHTS OF FLAT ROLLED IRON PER LINEAL FOOT.

(CONTINUED.)

Thickness in Inches.	9″	9¼″	9½″	9¾″	10″	10¼″	10½″	10¾″	12″
1/16	1.88	1.93	1.98	2.03	2.08	2.14	2.19	2.24	2.50
1/8	3.75	3.85	3.96	4.06	4.17	4.27	4.38	4.48	5.00
3/16	5.63	5.78	5.94	6.09	6.25	6.41	6.56	6.72	7.50
1/4	7.50	7.71	7.92	8.13	8.33	8.54	8.75	8.96	10.00
5/16	9.38	9.64	9.90	10.16	10.42	10.68	10.94	11.20	12.50
3/8	11.25	11.56	11.88	12.19	12.50	12.81	13.13	13.44	15.00
7/16	13.13	13.49	13.85	14.22	14.58	14.95	15.31	15.68	17.50
1/2	15.00	15.42	15.83	16.25	16.67	17.08	17.50	17.92	20.00
9/16	16.88	17.34	17.81	18.28	18.75	19.22	19.69	20.16	22.50
5/8	18.75	19.27	19.79	20.31	20.83	21.35	21.88	22.40	25.00
11/16	20.63	21.20	21.77	22.34	22.92	23.49	24.06	24.64	27.50
3/4	22.50	23.13	23.75	24.38	25.00	25.62	26.25	26.88	30.00
13/16	24.38	25.05	25.73	26.41	27.08	27.76	28.44	29.11	32.50
7/8	26.25	26.98	27.71	28.44	29.17	29.90	30.63	31.35	35.00
15/16	28.13	28.91	29.69	30.47	31.25	32.03	32.81	33.59	37.50
1	30.00	30.83	31.67	32.50	33.33	34.17	35.00	35.83	40.00
1 1/16	31.88	32.76	33.65	34.53	35.42	36.30	37.19	38.07	42.50
1 1/8	33.75	34.69	35.63	36.56	37.50	38.44	39.38	40.31	45.00
1 3/16	35.63	36.61	37.60	38.59	39.58	40.57	41.56	42.55	47.50
1 1/4	37.50	38.54	39.58	40.63	41.67	42.71	43.75	44.79	50.00
1 5/16	39.38	40.47	41.56	42.66	43.75	44.84	45.94	47.03	52.50
1 3/8	41.25	42.40	43.54	44.69	45.83	46.98	48.13	49.27	55.00
1 7/16	43.13	44.32	45.52	46.72	47.92	49.11	50.31	51.51	57.50
1 1/2	45.00	46.25	47.50	48.75	50.00	51.25	52.50	53.75	60.00
1 9/16	46.88	48.18	49.48	50.78	52.08	53.39	54.69	55.99	62.50
1 5/8	48.75	50.10	51.46	52.81	54.17	55.52	56.88	58.23	65.00
1 11/16	50.63	52.03	53.44	54.84	56.25	57.66	59.06	60.47	67.50
1 3/4	52.50	53.96	55.42	56.88	58.33	59.79	61.25	62.71	70.00
1 13/16	54.38	55.89	57.40	58.91	60.42	61.93	63.44	64.95	72.50
1 7/8	56.25	57.81	59.38	60.94	62.50	64.06	65.63	67.19	75.00
1 15/16	58.13	59.74	61.35	62.97	64.58	66.20	67.81	69.43	77.50
2	60.00	61.67	63.33	65.00	66.67	68.33	70.00	71.67	80.00

WEIGHTS OF FLAT ROLLED IRON PER LINEAL FOOT.

(CONTINUED.)

Thickness in Inches.	11″	11¼″	11½″	11¾″	12″	12¼″	12½″	12¾″
1/16	2.29	2.34	2.40	2.45	2.50	2.55	2.60	2.66
1/8	4.58	4.69	4.79	4.90	5.00	5.10	5.21	5.31
3/16	6.88	7.03	7.19	7.34	7.50	7.66	7.81	7.97
1/4	9.17	9.38	9.58	9.79	10.00	10.21	10.42	10.63
5/16	11.46	11.72	11.98	12.24	12.50	12.76	13.02	13.28
3/8	13.75	14.06	14.38	14.69	15.00	15.31	15.63	15.94
7/16	16.04	16.41	16.77	17.14	17.50	17.86	18.23	18.59
1/2	18.33	18.75	19.17	19.58	20.00	20.42	20.83	21.25
9/16	20.63	21.09	21.56	22.03	22.50	22.97	23.44	23.91
5/8	22.92	23.44	23.96	24.48	25.00	25.52	26.04	26.56
11/16	25.21	25.78	26.35	26.93	27.50	28.07	28.65	29.22
3/4	27.50	28.13	28.75	29.38	30.00	30.63	31.25	31.88
13/16	29.79	30.47	31.15	31.82	32.50	33.18	33.85	34.53
7/8	32.08	32.81	33.54	34.27	35.00	35.73	36.46	37.19
15/16	34.38	35.16	35.94	36.72	37.50	38.28	39.06	39.84
1	36.67	37.50	38.33	39.17	40.00	40.83	41.67	42.50
1 1/16	38.96	39.84	40.73	41.61	42.50	43.39	44.27	45.16
1 1/8	41.25	42.19	43.13	44.06	45.00	45.94	46.88	47.81
1 3/16	43.54	44.53	45.52	46.51	47.50	48.49	49.48	50.47
1 1/4	45.83	46.88	47.92	48.96	50.00	51.04	52.08	53.13
1 5/16	48.13	49.22	50.31	51.41	52.50	53.59	54.69	55.78
1 3/8	50.42	51.56	52.71	53.85	55.00	56.15	57.29	58.44
1 7/16	52.71	53.91	55.10	56.30	57.50	58.70	59.90	61.09
1 1/2	55.00	56.25	57.50	58.75	60.00	61.25	62.50	63.75
1 9/16	57.29	58.59	59.90	61.20	62.50	63.80	65.10	66.41
1 5/8	59.58	60.94	62.29	63.65	65.00	66.35	67.71	69.06
1 11/16	61.88	63.28	64.69	66.09	67.50	68.91	70.31	71.72
1 3/4	64.17	65.63	67.08	68.54	70.00	71.46	72.92	74.38
1 13/16	66.46	67.97	69.48	70.99	72.50	74.01	75.52	77.03
1 7/8	68.75	70.31	71 88	73.44	75.00	76.56	78.13	79.69
1 15/16	71.04	72.66	74 27	75.89	77.50	79.11	80.73	82.34
2	73.33	75.00	76.67	78.33	80.00	81.67	83.33	85.00

The weights for 12″ width are repeated on each page to facilitate making the additions necessary to obtain the weights of plates wider than 12″. Thus, to find the weight of 15¾″ × ⅞″, add the weights to be found in the same line for 3¾ × ⅞ and 12 × ⅞ = 9.48 + 35.00 = 44.48 lbs.

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

WEIGHTS AND AREAS OF SQUARE & ROUND BARS OF WROUGHT IRON

And Circumferences of Round Bars.

One cubic foot weighing 480 lbs.

Thickness or Diameter in Inches.	Weight of □ Bar One Foot long.	Weight of ○ Bar One Foot long.	Area of □ Bar in sq. inches.	Area of ○ Bar in sq. inches.	Circumference of ○ Bar in inches.
0					
1/16	.013	.010	.0039	.0031	.1963
1/8	.052	.041	.0156	.0123	.3927
3/16	.117	.092	.0352	.0276	.5890
1/4	.208	.164	.0625	.0491	.7854
5/16	.326	.256	.0977	.0767	.9817
3/8	.469	.368	.1406	.1104	1.1781
7/16	.638	.501	.1914	.1503	1.3744
1/2	.833	.654	.2500	.1963	1.5708
9/16	1.055	.828	.3164	.2485	1.7671
5/8	1.302	1.023	.3906	.3068	1.9635
11/16	1.576	1.237	.4727	.3712	2.1598
3/4	1.875	1.473	.5625	.4418	2.3562
13/16	2.201	1.728	.6602	.5185	2.5525
7/8	2.552	2.004	.7656	.6013	2.7489
15/16	2.930	2.301	.8789	.6903	2.9452
1	3.333	2.618	1.0000	.7854	3.1416
1 1/16	3.763	2.955	1.1289	.8866	3.3379
1 1/8	4.219	3.313	1.2656	.9940	3.5343
1 3/16	4.701	3.692	1.4102	1.1075	3.7306
1 1/4	5.208	4.091	1.5625	1.2272	3.9270
1 5/16	5.742	4.510	1.7227	1.3530	4.1233
1 3/8	6.302	4.950	1.8906	1.4849	4.3197
1 7/16	6.888	5.410	2.0664	1.6230	4.5160
1 1/2	7.500	5.890	2.2500	1.7671	4.7124
1 9/16	8.138	6.392	2.4414	1.9175	4.9087
1 5/8	8.802	6.913	2.6406	2.0739	5.1051
1 11/16	9.492	7.455	2.8477	2.2365	5.3014
1 3/4	10.21	8.018	3.0625	2.4053	5.4978
1 13/16	10.95	8.601	3.2852	2.5802	5.6941
1 7/8	11.72	9.204	3.5156	2.7612	5.8905
1 15/16	12.51	9.828	3.7539	2.9483	6.0868

SQUARE AND ROUND BARS.

(CONTINUED.)

Thickness or Diameter in Inches.	Weight of □ Bar One Foot long.	Weight of ○ Bar One Foot long.	Area of □ Bar in sq. inches.	Area of ○ Bar in sq. inches.	Circumference of ○ Bar in inches.
2	13.33	10.47	4.0000	3.1416	6.2832
1/16	14.18	11.14	4.2539	3.3410	6.4795
1/8	15.05	11.82	4.5156	3.5466	6.6759
3/16	15.95	12.53	4.7852	3.7583	6.8722
1/4	16.88	13.25	5.0625	3.9761	7.0686
5/16	17.83	14.00	5.3477	4.2000	7.2649
3/8	18.80	14.77	5.6406	4.4301	7.4613
7/16	19.80	15.55	5.9414	4.6664	7.6576
1/2	20.83	16.36	6.2500	4.9087	7.8540
9/16	21.89	17.19	6.5664	5.1572	8.0503
5/8	22.97	18.04	6.8906	5.4119	8.2467
11/16	24.08	18.91	7.2227	5.6727	8.4430
3/4	25.21	19.80	7.5625	5.9396	8.6394
13/16	26.37	20.71	7.9102	6.2126	8.8357
7/8	27.55	21.64	8.2656	6.4918	9.0321
15/16	28.76	22.59	8.6289	6.7771	9.2284
3	30.00	23.56	9.0000	7.0686	9.4248
1/16	31.26	24.55	9.3789	7.3662	9.6211
1/8	32.55	25.57	9.7656	7.6699	9.8175
3/16	33.87	26.60	10.160	7.9798	10.014
1/4	35.21	27.65	10.563	8.2958	10.210
5/16	36.58	28.73	10.973	8.6179	10.407
3/8	37.97	29.82	11.391	8.9462	10.603
7/16	39.39	30.94	11.816	9.2806	10.799
1/2	40.83	32.07	12.250	9.6211	10.996
9/16	42.30	33.23	12.691	9.9678	11.192
5/8	43.80	34.40	13.141	10.321	11.388
11/16	45.33	35.60	13.598	10.680	11.585
3/4	46.88	36.82	14.063	11.045	11.781
13/16	48.45	38.05	14.535	11.416	11.977
7/8	50.05	39.31	15.016	11.793	12.174
15/16	51.68	40.59	15.504	12.177	12.370

SQUARE AND ROUND BARS.

(CONTINUED.)

Thickness or Diameter in Inches.	Weight of □ Bar One Foot long.	Weight of ○ Bar One Foot long.	Area of □ Bar in sq. inches.	Area of ○ Bar in sq. inches.	Circumference of ○ Bar in inches.
4	53.33	41.89	16.000	12.566	12.566
1/16	55.01	43.21	16.504	12.962	12.763
1/8	56.72	44.55	17.016	13.364	12.959
3/16	58.45	45.91	17.535	13.772	13.155
1/4	60.21	47.29	18.063	14.186	13.352
5/16	61.99	48.69	18.598	14.607	13.548
3/8	63.80	50.11	19.141	15.033	13.744
7/16	65.64	51.55	19.691	15.466	13.941
1/2	67.50	53.01	20.250	15.904	14.137
9/16	69.39	54.50	20.816	16.349	14.334
5/8	71.30	56.00	21.391	16.800	14.530
11/16	73.24	57.52	21.973	17.257	14.726
3/4	75.21	59.07	22.563	17.721	14.923
13/16	77.20	60.63	23.160	18.190	15.119
7/8	79.22	62.22	23.766	18.665	15.315
15/16	81.26	63.82	24.379	19.147	15.512
5	83.33	65.45	25.000	19.635	15.708
1/16	85.43	67.10	25.629	20.129	15.904
1/8	87.55	68.76	26.266	20.629	16.101
3/16	89.70	70.45	26.910	21.135	16.297
1/4	91.88	72.16	27.563	21.648	16.493
5/16	94.08	73.89	28.223	22.166	16.690
3/8	96.30	75.64	28.891	22.691	16.886
7/16	98.55	77.40	29.566	23.221	17.082
1/2	100.8	79.19	30.250	23.758	17.279
9/16	103.1	81.00	30.941	24.301	17.475
5/8	105.5	82.83	31.641	24.850	17.671
11/16	107.8	84.69	32.348	25.406	17.868
3/4	110.2	86.56	33.063	25.967	18.064
13/16	112.6	88.45	33.785	26.535	18.261
7/8	115.1	90.36	34.516	27.109	18.457
15/16	117.5	92.29	35.254	27.688	18.653

SQUARE AND ROUND BARS.

(CONTINUED.)

Thickness or Diameter in Inches.	Weight of □ Bar One Foot long.	Weight of ○ Bar One Foot long.	Area of □ Bar in sq. inches.	Area of ○ Bar in sq. inches.	Circumference of ○ Bar in inches.
6	120.0	94.25	36.000	28.274	18.850
1/16	122.5	96.22	36.754	28.866	19.046
1/8	125.1	98.22	37.516	29.465	19.242
3/16	127.6	100.2	38.285	30.069	19.439
1/4	130.2	102.3	39.063	30.680	19.635
5/16	132.8	104.3	39.848	31.296	19.831
3/8	135.5	106.4	40.641	31.919	20.028
7/16	138.1	108.5	41.441	32.548	20.224
1/2	140.8	110.6	42.250	33.183	20.420
9/16	143.6	112.7	43.066	33.824	20.617
5/8	146.3	114.9	43.891	34.472	20.813
11/16	149.1	117.1	44.723	35.125	21.009
3/4	151.9	119.3	45.563	35.785	21.206
13/16	154.7	121.5	46.410	36.450	21.402
7/8	157.6	123.7	47.266	37.122	21.598
15/16	160.4	126.0	48.129	37.800	21.795
7	163.3	128.3	49.000	38.485	21.991
1/16	166.3	130.6	49.879	39.175	22.187
1/8	169.2	132.9	50.766	39.871	22.384
3/16	172.2	135.2	51.660	40.574	22.580
1/4	175.2	137.6	52.563	41.282	22.777
5/16	178.2	140.0	53.473	41.997	22.973
3/8	181.3	142.4	54.391	42.718	23.169
7/16	184.4	144.8	55.316	43.445	23.366
1/2	187.5	147.3	56.250	44.179	23.562
9/16	190.6	149.7	57.191	44.918	23.758
5/8	193.8	152.2	58.141	45.664	23.955
11/16	197.0	154.7	59.098	46.415	24.151
3/4	200.2	157.2	60.063	47.173	24.347
13/16	203.5	159.8	61.035	47.937	24.544
7/8	206.7	162.4	62.016	48.707	24.740
15/16	210.0	164.9	63.004	49.483	24.936

SQUARE AND ROUND BARS.

(CONTINUED.)

Thickness or Diameter in Inches.	Weight of □ Bar One Foot long.	Weight of ○ Bar One Foot long.	Area of □ Bar in sq. inches.	Area of ○ Bar in sq. inches.	Circumference of ○ Bar in inches.
8	213.3	167.6	64.000	50.265	25.133
1/16	216.7	170.2	65.004	51.054	25.329
1/8	220.1	172.8	66.016	51.849	25.525
3/16	223.5	175.5	67.035	52.649	25.722
1/4	226.9	178.2	68.063	53.456	25.918
5/16	230.3	180.9	69.098	54.269	26.114
3/8	233.8	183.6	70.141	55.088	26.311
7/16	237.3	186.4	71.191	55.914	26.507
1/2	240.8	189.2	72.250	56.745	26.704
9/16	244.4	191.9	73.316	57.583	26.900
5/8	248.0	194.8	74.391	58.426	27.096
11/16	251.6	197.6	75.473	59.276	27.293
3/4	255.2	200.4	76.563	60.132	27.489
13/16	258.9	203.3	77.660	60.994	27.685
7/8	262.6	206.2	78.766	61.862	27.882
15/16	266.3	209.1	79.879	62.737	28.078
9	270.0	212.1	81.000	63.617	28.274
1/16	273.8	215.0	82.129	64.504	28.471
1/8	277.6	218.0	83.266	65.397	28.667
3/16	281.4	221.0	84.410	66.296	28.863
1/4	285.2	224.0	85.563	67.201	29.060
5/16	289.1	227.0	86.723	68.112	29.256
3/8	293.0	230.1	87.891	69.029	29.452
7/16	296.9	233.2	89.066	69.953	29.649
1/2	300.8	236.3	90.250	70.882	29.845
9/16	304.8	239.4	91.441	71.818	30.041
5/8	308.8	242.5	92.641	72.760	30.238
11/16	312.8	245.7	93.848	73.708	30.434
3/4	316.9	248.9	95.063	74.662	30.631
13/16	321.0	252.1	96.285	75.622	30.827
7/8	325.1	255.3	97.516	76.589	31.023
15/16	329.2	258.5	98.754	77.561	31.220

SQUARE AND ROUND BARS.

(CONTINUED.)

Thickness or Diameter in Inches.	Weight of □ Bar One Foot long.	Weight of ○ Bar One Foot long.	Area of □ Bar in sq. inches.	Area of ○ Bar in sq. inches.	Circumference of ○ Bar in inches.
10	333.3	261.8	100.00	78.540	31.416
1/16	337.5	265.1	101.25	79.525	31.612
1/8	341.7	268.4	102.52	80.516	31.809
3/16	346.0	271.7	103.79	81.513	32.005
1/4	350.2	275.1	105.06	82.516	32.201
5/16	354.5	278.4	106.35	83.525	32.398
3/8	358.8	281.8	107.64	84.541	32.594
7/16	363.1	285.2	108.94	85.562	32.790
1/2	367.5	288.6	110.25	86.590	32.987
9/16	371.9	292.1	111.57	87.624	33.183
5/8	376.3	295.5	112.89	88.664	33.379
11/16	380.7	299.0	114.22	89.710	33.576
3/4	385.2	302.5	115.56	90.763	33.772
13/16	389.7	306.1	116.91	91.821	33.968
7/8	394.2	309.6	118.27	92.886	34.165
15/16	398.8	313.2	119.63	93.956	34.361
11	403.3	316.8	121.00	95.033	34.558
1/16	407.9	320.4	122.38	96.116	34.754
1/8	412.6	324.0	123.77	97.205	34.950
3/16	417.2	327.7	125.16	98.301	35.147
1/4	421.9	331.3	126.56	99.402	35.343
5/16	426.6	335.0	127.97	100.51	35.539
3/8	431.3	338.7	129.39	101.62	35.736
7/16	436.1	342.5	130.82	102.74	35.932
1/2	440.8	346.2	132.25	103.87	36.128
9/16	445.6	350.0	133.69	105.00	36.325
5/8	450.5	353.8	135.14	106.14	36.521
11/16	455.3	357.6	136.60	107.28	36.717
3/4	460.2	361.4	138.06	108.43	36.914
13/16	465.1	365.3	139.54	109.59	37.110
7/8	470.1	369.2	141.02	110.75	37.306
15/16	475.0	373.1	142.50	111.92	37.503

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

WEIGHT OF SHEETS OF WROUGHT IRON, STEEL, COPPER AND BRASS. (From Haswell.)

Weights per Square Foot. Thickness by Birmingham Gauge.

No. of Gauge.	Thickness in inches.	Iron.	Steel.	Copper.	Brass.
0000	.454	18.22	18.46	20.57	19.43
000	.425	17.05	17.28	19.25	18.19
00	.38	15.25	15.45	17.21	16.26
0	.34	13.64	13.82	15.40	14.55
1	.3	12.04	12.20	13.59	12.84
2	.284	11.40	11.55	12.87	12.16
3	.259	10.39	10.53	11.73	11.09
4	.238	9.55	9.68	10.78	10.19
5	.22	8.83	8.95	9.97	9.42
6	.203	8.15	8.25	9.20	8.69
7	.18	7.22	7.32	8.15	7.70
8	.165	6.62	6.71	7.47	7.06
9	.148	5.94	6.02	6.70	6.33
10	.134	5.38	5.45	6.07	5.74
11	.12	4.82	4.88	5.44	5.14
12	.109	4.37	4.43	4.94	4.67
13	.095	3.81	3.86	4.30	4.07
14	.083	3.33	3.37	3.76	3.55
15	.072	2.89	2.93	3.26	3.08
16	.065	2.61	2.64	2.94	2.78
17	.058	2.33	2.36	2.63	2.48
18	.049	1.97	1.99	2.22	2.10
19	.042	1.69	1.71	1.90	1.80
20	.035	1.40	1.42	1.59	1.50
21	.032	1.28	1.30	1.45	1.37
22	.028	1.12	1.14	1.27	1.20
23	.025	1.00	1.02	1.13	1.07
24	.022	.883	.895	1.00	.942
25	.02	.803	.813	.906	.856
26	.018	.722	.732	.815	.770
27	.016	.642	.651	.725	.685
28	.014	.562	.569	.634	.599
29	.013	.522	.529	.589	.556
30	.012	.482	.488	.544	.514
31	.01	.401	.407	.453	.428
32	.009	.361	.366	.408	.385
33	.008	.321	.325	.362	.342
34	.007	.281	.285	.317	.300
35	.005	.201	.203	.227	.214
Specific Gravity,		7.704	7.806	8.698	8.218
Weight Cubic Foot,		481.25	487.75	543.6	513.6
" " Inch,		.2787	.2823	.3146	.2972

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

WEIGHT OF SHEETS OF WROUGHT IRON, STEEL, COPPER AND BRASS. (From Haswell.)

Weights per Sq. Foot. Thickness by American (Browne & Sharpe's) Gauge.

No. of Gauge.	Thickness in inches.	Iron.	Steel.	Copper.	Brass.
0000	.46	18.46	18.70	20.84	19.69
000	.4096	16.44	16.66	18.56	17.53
00	.3648	14.64	14.83	16.53	15.61
0	.3249	13.04	13.21	14.72	13.90
1	.2893	11.61	11.76	13.11	12.38
2	.2576	10.34	10.48	11.67	11.03
3	.2294	9.21	9.33	10.39	9.82
4	.2043	8.20	8.31	9.26	8.74
5	.1819	7.30	7.40	8.24	7.79
6	.1620	6.50	6.59	7.34	6.93
7	.1443	5.79	5.87	6.54	6.18
8	.1285	5.16	5.22	5.82	5.50
9	.1144	4.59	4.65	5.18	4.90
10	.1019	4.09	4.14	4.62	4.36
11	.0907	3.64	3.69	4.11	3.88
12	.0808	3.24	3.29	3.66	3.46
13	.0720	2.89	2.93	3.26	3.08
14	.0641	2.57	2.61	2.90	2.74
15	.0571	2.29	2.32	2.59	2.44
16	.0508	2.04	2.07	2.30	2.18
17	.0453	1.82	1.84	2.05	1.94
18	.0403	1.62	1.64	1.83	1.73
19	.0359	1.44	1.46	1.63	1.54
20	.0320	1.28	1.30	1.45	1.37
21	.0285	1.14	1.16	1.29	1.22
22	.0253	1.02	1.03	1.15	1.08
23	.0226	.906	.918	1.02	.966
24	.0201	.807	.817	.911	.860
25	.0179	.718	.728	.811	.766
26	.0159	.640	.648	.722	.682
27	.0142	.570	.577	.643	.608
28	.0126	.507	.514	.573	.541
29	.0113	.452	.458	.510	.482
30	.0100	.402	.408	.454	.429
31	.0089	.358	.363	.404	.382
32	.0080	.319	.323	.360	.340
33	.0071	.284	.288	.321	.303
34	.0063	.253	.256	.286	.270
35	.0056	.225	.228	.254	.240

As there are many gauges in use differing from each other, and even the thicknesses of a certain specified gauge, as the Birmingham, are not assumed the same by all manufacturers, orders for sheets and wire should always state the weight per square foot, or the thickness in thousandths of an inch.

WEIGHT OF RIVETS, and ROUND HEADED BOLTS WITHOUT NUTS, PER 100.

Length from under head. One cubic foot weighing 480 lbs.

Length. Inches.	3/8" Dia.	1/2" Dia.	5/8" Dia.	3/4" Dia.	7/8" Dia.	1" Dia.	1 1/8" Dia.	1 1/4" Dia.
1 1/4	5.4	12.6	21.5	28.7	43.1	65.3	91.5	123.
1 1/2	6.2	13.9	23.7	31.8	47.3	70.7	98.4	133.
1 3/4	6.9	15.3	25.8	34.9	51.4	76.2	105.	142.
2	7.7	16.6	27.9	37.9	55.6	81.6	112.	150.
2 1/4	8.5	18.0	30.0	41.0	59.8	87.1	119.	159.
2 1/2	9.2	19.4	32.2	44.1	63.0	92.5	126.	167.
2 3/4	10.0	20.7	34.3	47.1	68.1	98.0	133.	176.
3	10.8	22.1	36.4	50.2	72.3	103.	140.	184
3 1/4	11.5	23.5	38.6	53.3	76.5	109.	147.	193.
3 1/2	12.3	24.8	40.7	56.4	80.7	114.	154.	201.
3 3/4	13.1	26.2	42.8	59.4	84.8	120.	161.	210.
4	13.8	27.5	45.0	62.5	89.0	125.	167.	218.
4 1/4	14.6	28.9	47.1	65.6	93.2	131.	174.	227.
4 1/2	15.4	30.3	49.2	68.6	97.4	136.	181.	236.
4 3/4	16.2	31.6	51.4	71.7	102.	142.	188.	244.
5	16.9	33.0	53.5	74.8	106.	147.	195.	253.
5 1/4	17.7	34.4	55.6	77.8	110.	153.	202.	261.
5 1/2	18.4	35.7	57.7	80.9	114.	158.	209.	270.
5 3/4	19.2	37.1	59.9	84.0	118.	163.	216.	278.
6	20.0	38.5	62.0	87.0	122.	169.	223.	287.
6 1/2	21.5	41.2	66.3	93.2	131.	180.	236.	304.
7	23.0	43.9	70.5	99.3	139.	191.	250.	321.
7 1/2	24.6	46.6	74.8	106.	147.	202.	264.	338.
8	26.1	49.4	79.0	112.	156.	213.	278.	355.
8 1/2	27.6	52.1	83.3	118.	164.	223.	292.	372.
9	29.2	54.8	87.6	124.	173.	234.	306.	389.
9 1/2	30.7	57.6	91.8	130.	181.	245.	319.	406.
10	32.2	60.3	96.1	136.	189.	256.	333.	423.
10 1/2	33.8	63.0	101.	142.	198.	267.	347.	440.
11	35.3	65.7	105.	148.	206.	278.	361.	457.
11 1/2	36.8	68.5	109.	155.	214.	289.	375.	474.
12	38.4	71.2	113.	161.	223.	300.	388.	491.
Heads.	1.8	5.7	10.9	13.4	22.2	38.0	57.0	82.0

WOODEN BEAMS.

Safe Load, Uniformly Distributed, for Rectangular White or Yellow Pine Beams one inch thick,

allowing 1200 lbs. per square inch fiber strain.

To obtain the safe load for any thickness, multiply the safe load given in table, by the thickness of beam.

To obtain the required thickness for any load, divide by the safe load for 1 inch, given in table.

Span in Feet.	DEPTH OF BEAM.										
	6″	7″	8″	9″	10″	11″	12″	13″	14″	15″	16″
Feet.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
5	960	1310	1710	2160	2670	3230	3840	4510	5230	6000	6830
6	800	1090	1420	1800	2220	2690	3200	3760	4360	5000	5690
7	690	930	1220	1540	1900	2300	2740	3220	3730	4290	4880
8	600	820	1070	1350	1670	2020	2400	2820	3270	3750	4270
9	530	730	950	1200	1480	1790	2130	2500	2900	3330	3790
10	480	650	850	1080	1330	1610	1920	2250	2610	3000	3410
11	440	590	780	980	1210	1470	1750	2050	2380	2730	3100
12	400	540	710	900	1110	1340	1600	1880	2180	2500	2840
13	370	500	660	830	1030	1240	1480	1730	2010	2310	2630
14	340	470	610	770	950	1150	1370	1610	1870	2140	2440
15	320	440	570	720	890	1080	1280	1500	1740	2000	2280
16	300	410	530	680	830	1010	1200	1410	1630	1880	2130
17	280	380	500	640	780	950	1130	1330	1540	1760	2010
18	270	360	470	600	740	900	1070	1250	1450	1670	1900
19	250	340	450	570	700	850	1010	1190	1380	1580	1800
20	240	330	430	540	670	810	960	1130	1310	1500	1710
21	230	310	410	510	630	770	910	1070	1240	1430	1630
22	220	300	390	490	610	730	870	1020	1190	1360	1550
23	210	280	370	470	580	700	830	980	1140	1300	1480
24	200	270	360	450	560	670	800	940	1090	1250	1420
25	190	260	340	430	530	650	770	900	1050	1200	1370
26	180	250	330	420	510	620	740	870	1010	1150	1310
27	180	240	320	400	500	600	710	830	970	1110	1260
28	170	230	300	390	480	580	690	800	930	1070	1220
29	170	230	290	370	460	560	660	780	900	1030	1180

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

WEIGHT OF

A CUBIC FOOT OF SUBSTANCES.

NAMES OF SUBSTANCES.	Average Weight. Lbs.
Anthracite, solid, of Pennsylvania,	93
" broken, loose,	54
" " moderately shaken,	58
" heaped bushel, loose,	(80)
Ash, American white, dry,	38
Asphaltum,	87
Brass, (Copper and Zinc,) cast,	504
" rolled,	524
Brick, best pressed,	150
" common hard,	125
" soft, inferior,	100
Brickwork, pressed brick,	140
" ordinary,	112
Cement, hydraulic, ground, loose, American, Rosendale,	56
" " " " " Louisville,	50
" " " " English, Portland,	90
Cherry, dry,	42
Chestnut, dry,	41
Coal, bituminous, solid,	84
" " broken, loose,	49
" " heaped bushel, loose,	(74)
Coke, loose, of good coal,	27
" " heaped bushel,	(38)
Copper, cast,	542
" rolled,	548
Earth, common loam, dry, loose,	76
" " " " moderately rammed,	95
" as a soft flowing mud,	108
Ebony, dry,	76
Elm, dry,	35
Flint,	162
Glass, common window,	157

WEIGHT OF SUBSTANCES—Continued.

NAMES OF SUBSTANCES.	Average Weight. Lbs.
Gneiss, common,	168
Gold, cast, pure, or 24 carat,	1204
" pure, hammered,	1217
Granite,	170
Gravel, about the same as sand, which see.	
Hemlock, dry,	25
Hickory, dry,	53
Hornblende, black,	203
Ice,	58.7
Iron, cast,	450
" wrought, purest,	485
" " average,	480
Ivory,	114
Lead,	711
Lignum Vitæ, dry,	83
Lime, quick, ground, loose, or in small lumps,	53
" " " " thoroughly shaken,	75
" " " " per struck bushel,	(66)
Limestones and Marbles,	168
" " loose, in irregular fragments,	96
Mahogany, Spanish, dry,	53
" Honduras, dry,	35
Maple, dry,	49
Marbles, see Limestones.	
Masonry, of granite or limestone, well dressed,	165
" " mortar rubble,	154
" " dry " (well scabbled,)	138
" " sandstone, well dressed,	144
Mercury, at 32° Fahrenheit,	849
Mica,	183
Mortar, hardened,	103
Mud, dry, close,	80 to 110
" wet, fluid, maximum,	120
Oak, live, dry,	59

WEIGHT OF SUBSTANCES—Continued.

NAMES OF SUBSTANCES.	Average Weight, Lbs.
Oak, white, dry,	52
" other kinds,	32 to 45
Petroleum,	55
Pine, white, dry,	25
" yellow, Northern,	34
" " Southern,	45
Platinum,	1342
Quartz, common, pure,	165
Rosin,	69
Salt, coarse, Syracuse, N. Y.	45
" Liverpool, fine, for table use,	49
Sand, of pure quartz, dry, loose,	90 to 106
" well shaken,	99 to 117
" perfectly wet,	120 to 140
Sandstones, fit for building,	151
Shales, red or black,	162
Silver,	655
Slate,	175
Snow, freshly fallen,	5 to 12
" moistened and compacted by rain,	15 to 50
Spruce, dry,	25
Steel,	490
Sulphur,	125
Sycamore, dry,	37
Tar,	62
Tin, cast,	459
Turf or Peat, dry, unpressed,	20 to 30
Walnut, black, dry,	38
Water, pure rain or distilled, at 60° Fahrenheit,	62⅓
" sea,	64
Wax, bees,	60.5
Zinc or Spelter,	437

Green timbers usually weigh from one-fifth to one-half more than dry.

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LINEAR EXPANSION OF SUBSTANCES BY HEAT.

To find the increase in the length of a bar of any material due to an increase of temperature, multiply the number of degrees of increase of temperature by the coefficient for 100 degrees and by the length of the bar, and divide by 100.

NAME OF SUBSTANCE.	Coefficient for 100° Fahrenheit.	Coefficient for 180° Fahrenheit, or 100° Centigrade.
Baywood, (in the direction of the grain, dry,)	.00026 TO .00031	.00046 TO .00057
Brass, (cast,)	.00104	.00188
" (wire,)	.00107	.00193
Brick, (fire,)	.0003	.0005
Cement, (Roman,)	.0008	.0014
Copper,	.0009	.0017
Deal, (in the direction of the grain, dry,)	.00024	.00044
Glass, (English flint,)	.00045	.00081
" (French white lead,)	.00048	.00087
Gold,	.0008	.0015
Granite, (average,)	.00047	.00085
Iron, (cast,)	.0006	.0011
" (soft forged,)	.0007	.0012
" (wire,)	.0008	.0014
Lead,	.0016	.0029
Marble, (Carrara,)	.00036 TO .0006	.00065 TO .0011
Mercury,	.0033	.0060
Platinum,	.0005	.0009
Sandstone,	.0005 TO .0007	.0009 TO .0012
Silver,	.0011	.002
Slate, (Wales,)	.0006	.001
Water, (varies considerably with the temperature,)	.0086	.0155

STRENGTH OF MATERIALS.

ULTIMATE RESISTANCE TO TENSION

IN LBS. PER SQUARE INCH.

METALS.

	Average.
Brass, cast,	18000
" wire,	49000
Bronze or gun metal,	36000
Copper, cast,	19000
" sheet,	30000
" bolts,	36000
" wire,	60000
Iron, cast, 13400 to 29000,	16500
" wrought, round or square bars of 1 to 2 inch diameter, double refined,	50000 to 54000
" wrought, specimens ½ inch square, cut from large bars of double refined iron,	50000 to 53000
" wrought, double refined, in large bars of about 7 square inches section,	46000 to 47000
" wrought, plates, angles and other shapes,	48000 to 51000
" " plates over 36″ wide,	46000 to 50000

Wrought iron, suitable for the tension members of bridges, should be double refined, and show a permanent elongation of 20 per cent. in 5″, when broken in small specimens, and a reduction of area of 25 per cent. at point of fracture.

The modulus of elasticity of Union Iron Mills' double refined bar iron is 25000000 to 26000000, from tests made on finished eyebars.

Iron, wire,	70000 to 100000
" wire-ropes,	90000
Lead, sheet,	3300
Steel,	65000 to 120000
Tin, cast,	4600
Zinc,	7000 to 8000

STRENGTH OF MATERIALS—Continued.

TIMBER, SEASONED, AND OTHER ORGANIC FIBER.

	Average.
Ash, English,	17000
" American,	11000 to 14000
Beech, "	15000 to 18000
Box,	20000
Cedar of Lebanon,	11400
" American, red,	10300
Fir or Spruce,	10000 to 13600
Hempen Ropes,	12000 to 16000
Hickory, American,	12800 to 18000
Mahogany,	8000 to 21800
Oak, American, white,	18000
" European,	10000 to 19800
Pine, American, white, red and pitch, Memel, Riga,	10000
" " long leaf yellow,	12600 to 19200
Poplar,	7000
Silk fiber,	52000
Walnut, black,	16000

STONE, NATURAL AND ARTIFICIAL.

Brick and Cement,	280 to 300
Glass,	9400
Slate,	9600 to 12800
Mortar, ordinary,	50

ULTIMATE RESISTANCE TO COMPRESSION.

METALS.

Brass, cast,	10300
Iron, "	82000 to 145000
" wrought,	36000 to 40000

STRENGTH OF MATERIALS—Continued.

TIMBER, SEASONED, COMPRESSED IN THE DIRECTION OF THE GRAIN.

	Average.
Ash, American,	4400 to 5800
Beech, "	5800 to 6900
Box,	10300
Cedar of Lebanon,	5900
" American, red,	6000
Deal, red,	6500
Fir or Spruce,	5100 to 6800
Oak, American, white,	7200 to 9100
" British,	10000
" Dantzig,	7700
Pine, American, white,	5000 to 5600
" " long leaf yellow,	8000
Spruce or Fir,	5800 to 6900
Walnut, black,	7500

STONE, NATURAL OR ARTIFICIAL.

Brick, weak,	550 to 800
" strong,	1100
" fire,	1700
Brickwork, ordinary, in cement,	300 to 450
" best,	1000
Chalk,	330
Granite,	5500 to 11000
Limestone,	4000 to 11000
Sandstone, ordinary,	4000

ULTIMATE RESISTANCE TO SHEARING.

METALS.

Iron, cast,	27700
" wrought, along the fiber,	45000

TIMBER, ALONG THE GRAIN.

White Pine, Spruce, Hemlock,	500 to 800
Yellow Pine, long leaf,	630 to 960
Oak, European,	2300
Ash, American,	2000

KEYSTONE BRIDGE CO.'S CORRUGATED IRON.

The following table is calculated for sheets 30½″ wide before corrugating.

No. by Birmingham Gauge.	Thickness. Inch.	Weight per Square Foot, Flat. Lbs.	Weight per Square Foot, Corrugated. Lbs.	Weight per Square of 100 square feet, when laid, allowing 6″ lap in length and 2½″ or one corrugation in width of sheet, for sheet lengths of: 5′	6′	7′	8′	9′	10′	Weight per Square Foot, Flat, Galvanized. Lbs.
16	.065	2.61	3.28	365	358	353	350	348	346	2.95
18	.049	1.97	2.48	275	270	267	264	262	261	2.31
20	.035	1.40	1.76	196	192	190	188	186	185	1.74
22	.028	1.12	1.41	156	154	152	150	149	148	1.46
24	.022	.88	1.11	123	121	119	118	117	117	1.22
26	.018	.72	.91	101	99	97	97	96	95	1.06

RESULTS OF TEST

of a corrugated sheet No. 20, 2′–0″ wide, 6′–0″ long between supports, loaded uniformly with fire clay.

Load per Square Foot. Lbs.	Deflection at Center under Load. Inches.	Permanent Deflection, Load Removed.
5	½	0
10	¾	0
15	1	0
20	1¼	0
25	1½	0
30	1⅞	⅛
35	2¼	½
40	2⅝	¾
45	3½	1⅛
50	4	1½
55	6½	Not Noted.
60	Broke Down.	" "

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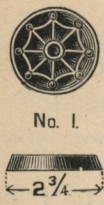
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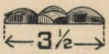

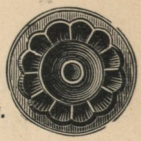
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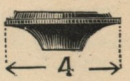

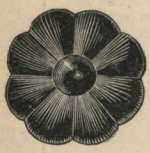
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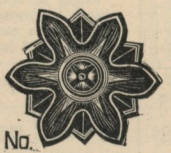
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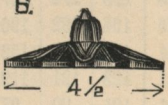

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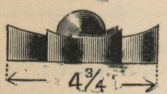

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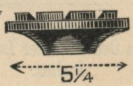

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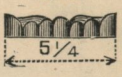

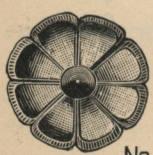
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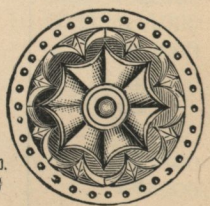
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ROSETTES.

We are constantly making new patterns.

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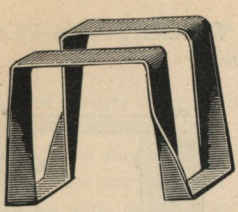
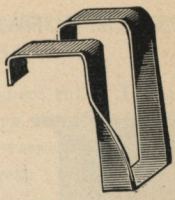
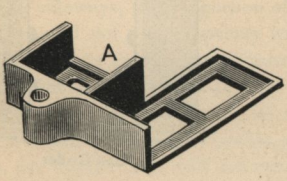
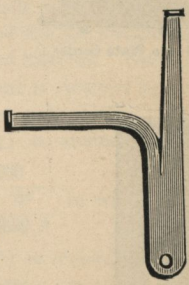


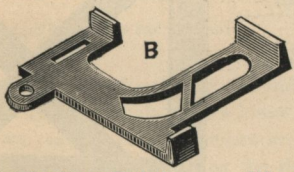
Double Stirrup.



Single Stirrup.

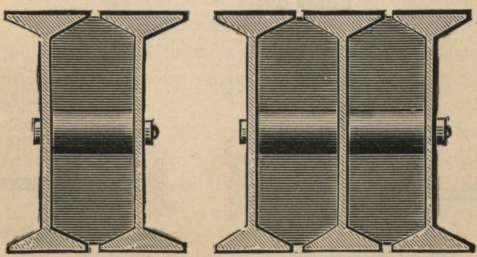






Cast Shutter Brick.

Wrought Shutter Brick.



Girders formed of two or more I Beams.

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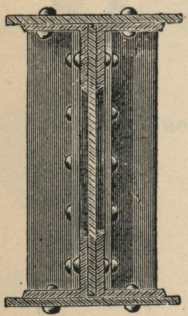
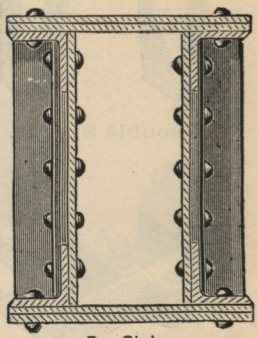
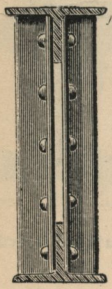
RIVETED GIRDERS

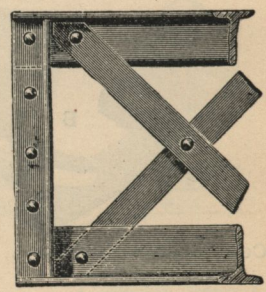


Single Plate Girder.

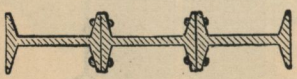


Box Girder.





Lattice Girder.



Triple I Beam Girder.

Double I Beam Girder.

EXPLANATION OF TABLE ON RIVETED GIRDERS.

Riveted girders are used in cases where rolled I Beams are insufficient to carry the load. On page 148 of the lithographed plates will be found illustrations of various forms of riveted girders. The sections with single webs are mo economical than those with double webs (box girders), but th latter are stiffer laterally, and should always be used where a great length of span requires a wide top flange. If the girder is not held in position sideways, the proportion of length of span to width of flange should not exceed twenty without making provision for such increase by an addition of metal in the compression flange beyond that required by the table.

The web of the girder must be made of such thickness that there will be no tendency to buckle, and that the vertical shearing stress per square inch will not exceed 9000 lbs. This shearing stress is greatest nearest the supports and is obtained by dividing half the load upon the girder by the web section. The first condition (security against buckling) is attained when this shearing stress does not exceed $\frac{10000}{1+\frac{d^2}{3000\,t^2}}$ in which d represents the depth of web of girder and t its thickness, in inches. Ordinarily this formula gives a lower strain per square inch than 9000 lbs., so that both conditions are usually attained when the first is. Instead of increasing the thickness of the web, it may be stiffened also by means of vertical angle irons riveted to it at proper intervals. These latter should always be less than the depth of the girder, at least near the ends, but towards the middle of the girder the stiffeners may be placed further apart or entirely omitted. Stiffeners should always be used at or near the supports, and at any other points where there is a concentration of heavy loads.

The rivets should be ¾″, unless the girder is light, when ⅝″ may be sufficient. The spacing ought not to exceed 6″ and should be closer for heavy flanges, but in all cases it should be close at the ends, say 3″ for a distance of 18″ to 24″ at each end.

The following table furnishes a ready means of determining the section of girder necessary to carry a certain load, for any span length from 10 to 39 feet, inclusive.

It will be noticed that the table is calculated for an allowed fiber strain of 10000 lbs. per square inch, while the tables on rolled beams are calculated for a fiber strain of 12000 lbs. per square inch. This reduction in the allowed strain is intended to cover the loss in strength, (somewhat greater than the loss in section,) due to the rivet holes, and the riveted girders proportioned by this table, will be found to be of about the same strength as the rolled beams proportioned by the tables applying to them. The transverse strength of the web is neglected in the table.

The term flange, as applied to riveted girders, embraces all the metal in top or bottom of girder exclusive of web plate; or, in the case of a rolled beam or channel with top and bottom plates, all the metal exclusive of web between fillets.

Girders intended to carry plastering, should be limited in depth, out to out, to $\frac{1}{24}$th of the span length or $\frac{1}{2}''$ per foot of this length, otherwise the deflection is liable to cause the plastering to crack.

EXAMPLE OF APPLICATION OF TABLE.

A 20″ box girder is to carry a 13″ brick wall, equivalent to a weight of 30 tons over a space 20′ in the clear. What size of girder is required?

Answer: The value of the coefficient for 20′ span and 20″ depth, as per table, = 300, and for 21′ span and 20″ depth = 315. The span, in this case, may be assumed at 20′–6″, and the coefficient therefore at 307. Consequently $\frac{307 \times 30}{1000} = 9.21$ will be the area required in each flange. Making the top and bottom plates $12'' \times \frac{3}{8}''$, = 4.5 sq. in., there remain 4.7 sq. in. for the two angles, = 8 lbs. per foot apiece. Making the webs $20'' \times \frac{1}{4}''$, the shearing stress $= \frac{30 \times 2000 \times \frac{1}{2}}{2 \times 20 \times \frac{1}{4}} = 3000$ lbs. per square inch, which is also safe against buckling, since

$$\frac{10000}{1 + \frac{d^2}{3000\, t^2}} = \frac{10000}{1 + \frac{(20)^2}{3000\,(\frac{1}{4})^2}} = 3200 \text{ lbs., allowed.}$$

RIVETED GIRDERS.

Coefficients for determining the area required in flanges, allowing 10000 lbs. per square inch of gross section fiber strain:

Multiply the load, in tons of 2000 lbs., uniformly distributed, by the coefficient, and divide by 1000; the quotient will be the gross area, in square inches, required for each flange.

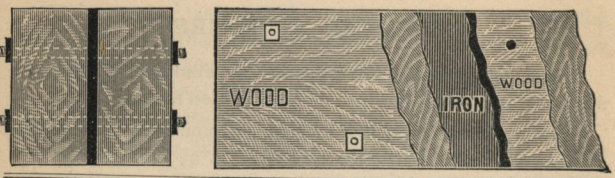
Distance between supports in Feet.	Depth of Girder, Out to Out of Web, in Inches.												
	12	14	16	18	20	22	24	26	28	30	32	34	36
10	250	214	188	167	150	136	125	115	107	100	94	88	83
11	275	236	206	183	165	150	138	127	118	110	103	97	92
12	300	257	225	200	180	164	150	138	129	120	113	106	100
13	325	279	244	217	195	177	163	150	139	130	122	115	108
14	350	300	263	233	210	191	175	162	150	140	131	124	117
15	375	321	281	250	225	205	188	173	161	150	141	132	125
16	400	343	300	267	240	218	200	185	171	160	150	141	133
17	425	364	319	283	255	232	213	196	182	170	159	150	142
18	450	386	338	300	270	245	225	208	193	180	169	159	150
19	475	407	356	317	285	259	238	219	204	190	178	168	158
20	500	429	375	333	300	273	250	231	214	200	188	176	167
21	525	450	394	350	315	286	263	242	225	210	197	185	175
22	550	471	413	367	330	300	275	254	236	220	206	194	183
23	575	493	431	383	345	314	288	265	246	230	216	203	192
24	600	514	450	400	360	327	300	277	257	240	225	212	200
25	625	536	469	417	375	341	313	288	268	250	234	221	208
26	650	557	488	433	390	355	325	300	279	260	244	229	217
27	675	579	506	450	405	368	338	312	289	270	253	238	225
28	700	600	525	467	420	382	350	323	300	280	263	247	233
29	725	621	544	483	435	395	363	335	311	290	272	256	242
30	750	643	563	500	450	409	375	346	321	300	281	265	250
31	775	664	581	517	465	423	388	358	332	310	291	274	258
32	800	686	600	533	480	436	400	369	343	320	300	282	267
33	825	707	619	550	495	450	413	381	354	330	309	291	275
34	850	729	638	567	510	464	425	392	364	340	319	300	283
35	875	750	656	583	525	477	438	404	375	350	328	309	292
36	900	771	675	600	540	491	450	415	386	360	338	318	300
37	925	793	694	617	555	505	463	427	396	370	347	326	308
38	950	814	713	633	570	518	475	438	407	380	356	335	317
39	975	836	731	650	585	532	488	450	418	390	366	344	325

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Flitch Plate Girders.

Strength of Flitch Plate Girders composed of two wood beams with wrought plate between, all firmly bolted, viz.:



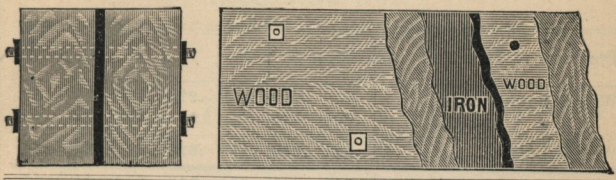
Span in Feet.	Safe Load in Tons for Plates of the following Thickness. ¼	⅜	½	⅝	¾	Safe Load for each 1 in. thickness of wood in tons of 2,000 lbs.
	DEPTH, 10 INCHES.					
8	2.09	3.12	4.18	5.21	6.25	0.937
9	1.85	2.75	3.70	4.58	5.50	0.85
10	1.67	2.50	3.34	4.17	5.00	0.75
11	1.50	2.28	3.00	2.80	4.56	0.68
12	1.39	2.10	2.78	3.50	4.20	0.62
13	1.27	1.92	2.54	3.20	3.84	0.58
14	1.18	1.78	2.36	2.97	3.56	0.536
15	1.11	1.67	2.22	2.75	3.34	0.50
16	1.04	1.53	2.08	2.55	3.06	0.468
17	0.96	1.46	1.92	2.40	2.92	0.44
18	0.92	1.38	1.84	2.28	2.76	0.417
19	0.88	1.32	1.76	2.20	2.64	0.392
20	0.84	1.25	1.68	2.08	2.50	0.375
21	0.80	1.18	1.60	1.99	2.36	0.354
22	0.77	1.14	1.54	1.89	2.28	0.34
23	0.74	1.09	1.48	1.80	2.19	0.325
24	0.70	1.05	1.40	1.72	2.09	0.31
25	0.66	1.00	1.33	1.66	2.00	0.3
26	0.64	0.97	1.28	1.61	1.94	0.286
27	0.61	0.94	1.22	1.56	1.88	0.275
28	0.60	0.90	1.20	1.51	1.80	0.267
29	0.58	0.88	1.16	1.45	1.76	0.258
30	0.55	0.83	1.10	1.40	1.66	0.25
	DEPTH, 12 INCHES.					
8	3.00	4.50	6.00	7.50	9.00	1.35
9	2.70	4.00	5.40	6.68	8.00	1.20
10	2.40	3.60	4.80	6.00	7.20	1.08
11	2.16	3.30	4.32	5.50	6.60	0.99
12	2.00	3.00	4.00	5.00	6.00	0.90
13	1.83	2.75	3.66	4.64	5.50	0.845
14	1.71	2.56	3.42	4.30	5.12	0.772
15	1.60	2.40	3.20	4.00	4.80	0.725
16	1.50	2.25	3.00	3.75	4.50	0.675
17	1.40	2.10	2.80	3.52	4.20	0.64
18	1.32	2.00	2.63	3.32	4.00	0.60
19	1.27	1.90	2.53	3.16	3.80	0.565
20	1.20	1.80	2.40	3.00	3.60	0.54
21	1.17	1.72	2.24	2.84	3.44	0.50
22	1.12	1.66	2.14	2.75	3.32	0.465
23	1.08	1.59	2.10	2.62	3.18	0.46
24	1.00	1.50	2.00	2.50	3.00	0.445
25	0.97	1.45	1.94	2.41	2.90	0.43
26	0.94	1.40	1.88	2.32	2.80	0.415
27	0.90	1.35	1.80	2.23	2.70	0.40
28	0.87	1.30	1.74	2.16	2.60	0.385
29	0.83	1.25	1.66	2.08	2.50	0.37
30	0.80	1.20	1.60	2.00	2.40	0.36

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

FLITCH PLATE GIRDERS.

Strength of Flitch Plate Girders composed of two wood beams with wrought plate between, all firmly bolted, viz.:



SPAN IN FEET.	Safe Load in Tons for Plates of the following Thickness.					Safe Load for each 1 in. thickness of wood in tons of 2,000 lbs.
	¼	⅜	½	⅝	¾	
	DEPTH, 14 INCHES.					
8	4.08	6.12	8.16	10.21	12.25	1.837
9	3.61	5.50	7.22	9.20	11.00	1.625
10	3.25	4.90	6.50	8.16	9.80	1.47
11	3.00	4.50	6.00	7.50	9.00	1.325
12	2.72	4.08	5.44	6.80	8.16	1.225
13	2.56	3.81	5.12	6.30	7.62	1.125
14	2.36	3.52	4.72	5.82	7.04	1.05
15	2.20	3.28	4.40	5.40	6.56	0.98
16	2.04	3.06	4.08	5.04	6.12	0.94
17	1.90	2.85	3.80	4.72	5.70	0.865
18	1.81	2.70	3.62	4.50	5.40	0.817
19	1.70	2.55	3.40	4.29	5.10	0.76
20	1.62	2.45	3.24	4.08	4.90	0.735
21	1.55	2.30	3.10	3.89	4.60	0.695
22	1.48	2.20	2.96	3.72	4.40	0.66
23	1.42	2.10	2.84	3.58	4.20	0.635
24	1.36	2.04	2.72	3.40	4.08	0.61
25	1.31	1.97	2.62	3.27	3.94	0.588
26	1.27	1.90	2.54	3.15	3.80	0.56
27	1.22	1.83	2.44	3.03	3.66	0.545
28	1.18	1.76	2.36	2.93	3.52	0.525
29	1.13	1.70	2.26	2.81	3.40	0.505
30	1.08	1.63	2.16	2.72	3.26	0.49
	DEPTH, 16 INCHES.					
8	5.33	8.00	10.66	13.18	16.00	2.4
9	4.75	7.20	9.50	11.90	14.40	2.15
10	4.26	6.40	8.52	10.55	12.80	1.92
11	3.90	5.90	7.80	9.60	11.80	1.75
12	3.56	5.33	7.12	8.78	10.67	1.60
13	3.30	4.95	6 60	8.10	9.90	1.485
14	3.06	4.55	6.12	7.54	9.10	1.37
15	2.85	4.20	5.70	7.02	8.58	1.29
16	2.67	4.00	5.34	6.59	8.00	1.20
17	2.51	3.75	5.02	6.20	7.50	1.13
18	2.39	3.55	4.78	5.89	7.10	1.065
19	2.28	3.37	4.50	5.59	6.74	1.02
20	2.13	3.20	4.27	5.27	6.40	0.96
21	2.02	3.03	4.04	5.02	6.06	0.915
22	1.93	2.94	3.86	4.80	5.88	0.87
23	1.85	2.78	3.70	4.58	5.56	0.825
24	1.78	2.66	3.56	4.39	5.33	0.795
25	1.69	2.55	3.38	4.20	5.10	0.765
26	1.62	2.45	3.24	4.03	4.90	0.735
27	1.56	2.35	3.12	3.96	4.70	0.70
28	1.51	2.27	3.02	3.77	4.54	0.675
29	1.46	2.20	2.92	3.64	4.40	0.655
30	1.42	2.13	2.85	3.52	4.26	0.64

Weight of Nuts and Bolt Heads.

Diameter of Bolt.....	¼	⅜	½	⅝	¾	⅞	1
Weight Square Nut.....	.015	.049	.118	.228	.323	.53	.68
" " Head.....	.006	.020	.046	.092	.227	.35	.63
Weight both.....	.021	.069	.164	.320	.55	.88	1.31
Weight Hexagon Nut.....	.013	.041	.071	.147	.272	.44	.57
" " Head.....	.004	.016	.057	.120	.158	.29	.53
Weight both.....	.017	.057	.128	.267	.43	.73	1.10

Diameter of Bolt...	1¼	1½	1¾	2	2½	3	
Weight Square Nut.....	1.45	3.19	5.	7.50	11.3	16.1	
" " Head.....	1.11	1.23	2.	3.00	9.7	20.3	
Weight both.....	2.56	4.42	7.	10.50	21.	36.4	
Weight Hexagon Nut.....	1.34	2.35	3.7	4.50	8.10	11.50	
" " Head.....	.80	1.43	1.9	4.25	8.90	27.30	
Weight both.....	2.14	3.78	5.6	8.75	17.	38.8	

TIE RODS FOR FLOOR BEAMS.

¾ inch rods weigh 1½ lbs. per foot. Allow 3 inch projections at each end. Add for two nuts or nut and head, ¾ lbs.

STANDARD CONNECTION ANGLES FOR BEAMS.

HOLES PUNCHED FOR ¾ INCH BOLTS.

20 inch Beam, 2 angles, 4×4×⅜ by 15 in. long. 5 rivets, 10 bolts. Weight, 38 lbs.

15 inch Beam, 2 angles, 4×4×⅜ by 10 in. long. 3 rivets, 6 bolts. Weight, 26 lbs.

12 inch Beam, 2 angles, 4×4×⅜ by 8½ in. long. 3 rivets, 6 bolts. Weight, 22 lbs.

10 and 10½ inch Beam, 2 angles, 3½×3½×⅜ by 6½ in. long. 2 rivets, 4 bolts. Weight, 15 lbs.

8 and 9 inch Beam, 2 angles, 3½×3½×⅜ by 5 in. long. 2 rivets, 4 bolts. Weight, 14 lbs.

7 inch Beam, 2 angles, 3½×3½×⅜ by 4¾ in. long. 2 rivets, 4 bolts. Weight, 12½ lbs.

6 and 5 inch Beam, 2 angles, 3½×6×⅜ by 2¾ in. long. 2 rivets, 2 bolts. Weight, 11 lbs.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

WEIGHT OF BOLTS PER 100,

INCLUDING NUT.

Length.	DIAMETER.								
	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
1½	4.	7.	10.50	15.20	22.50	39.50	.....	.....	....
1¾	4.35	7.50	11.25	16.30	23.82	41.62	.....	.....	....
2	4.75	8.	12.	17.40	25.15	43.75	69.	.....	....
2¼	5.15	8.50	12.75	18.50	26.47	45.88	72.	.....	....
2½	5.50	9.	13.50	19.60	27.80	48.	75.	116.50	....
2¾	5.75	9.50	14.25	20.70	29.12	50.12	78.	121.75	....
3	6.25	10.	15.	21.80	30.45	52.25	81.	126.	....
3½	7.	11.	16.50	24.	33.10	56.50	87.	134.25	....
4	7.75	12.	18.	26.20	35.75	60.75	93.10	142.50	207
4½	8.50	13.	19.50	28.40	38.40	65.	99.05	151.	218
5	9.25	14.	21.	30.60	41.05	69.25	105.20	159.55	229
5½	10.	15.	22.50	32.80	43.70	73.50	111.25	168.	240
6	10.75	16.	24.	35.	46.35	77.75	117.30	176.60	251
6½	.....	.....	25.50	37.20	49.	82.	123.35	185.	262
7	.....	.....	27.	39.40	51.65	86.25	129.40	193.65	273
7½	.....	.....	28.50	41.60	54.30	90.50	135.	202.	284
8	.....	.....	30.	43.80	59.60	94.75	141.50	210.70	295
9	.....	.....	.....	46.	64.90	103.25	153.60	227.75	317
10	.....	.....	.....	48.20	70.20	111.75	165.70	244.80	339
11	.....	.....	.....	50.40	75.50	120.25	177.80	261.85	360
12	.....	.....	.....	52.60	80.80	128.75	189.90	278.90	382
13	.....	.....	.....	.....	86.10	137.25	202.	295.95	404
14	.....	.....	.....	.....	91.40	145.75	214.10	313.	426
15	.....	.....	.....	.....	96.70	154.25	226.20	330.05	448
16	.....	.....	.....	.....	102.	162.75	238.30	347.10	470
17	.....	.....	.....	.....	107.30	171.	250.40	364.15	492
18	.....	.....	.....	.....	112.60	179.50	262.60	381.20	514
19	.....	.....	.....	.....	117.90	188.	274.70	398.25	536
20	.....	.....	.....	.....	123.20	206.50	286.80	415.30	558

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

FIRE ESCAPES.

WE are manufacturers of Stand Pipe and Plain Ladder **FIRE ESCAPES,** with all the latest improvements in Balconies, Steps, Valves and Water Connections. Send for prices.

We make the following styles of Fire Escapes, viz:

No. 1.—Plain Ladder with Wrought or Cast Iron Balconies.

No. 2—Stand Pipe and Ladder with Wrought or Cast Iron Balconies, patent valves, Siamese water connections, etc.

No. 3.—Same as No. 2, with addition of balcony with railing.

Send for cuts.

SPECIAL STYLES TO ORDER.

Our Fire Escapes are provided with Ice Proof Balconies, any desired style of water connection and valves.

The Ladders are made separately from Stand Pipes and securely bolted to them, and both are firmly anchored by strong brackets to walls of buildings.

MISCELLANEOUS RULES AND TABLES.

RULE FOR FINDING THE SECTIONAL AREA OF A BAR OF WROUGHT IRON, GIVEN THE WEIGHT PER FOOT:

Multiply by 3 and divide by 10.

RULE FOR FINDING THE WEIGHT PER FOOT, GIVEN THE AREA:

Divide by 3 and multiply by 10.

RULES FOR OBTAINING APPROXIMATE WEIGHT OF WROUGHT IRON.

FOR ROUND BARS.

Rule: Multiply the square of the diameter in inches by the length in feet, and that product by 2.6. The product will be the weight in pounds, nearly.

FOR SQUARE AND FLAT WROUGHT BARS.

Rule: Multiply the area of the end of the bar in inches by the length in feet, and that by 3.32. The product will be the weight in pounds, nearly.

WROUGHT IRON, ASSUMED WEIGHT.

A cubic foot	= 480 lbs.
A square foot, 1 inch thick	= 40 "
A bar 1 in. square, 1 foot long	= 3⅓ "
A " " " 1 yard long	= 10 "

TO CONVERT WEIGHT OF

Wrought Iron into Cast Iron	× 0.928
" " Steel	× 1.014
" " Zinc	× 0.918
" " Brass	× 1.082
" " Copper	× 1.144
" " Lead	× 1.468
Square Iron into Round	× .7854

DECIMAL APPROXIMATIONS USEFUL IN CALCULATIONS.

Cubic inches,	× .267	=	lbs.	average cast iron.
" "	× .281	=	"	" wrought iron.
" "	× .283	=	"	" cast steel.
" "	× .3225	=	"	" copper.
" "	× .3037	=	"	" brass.
" "	× .26	=	"	" zinc.
" "	× .4103	=	"	" lead.
" "	× .2636	=	"	" tin.
" "	× .4908	=	"	" mercury.
Cylin. "	× .2065	=	"	" cast iron.
" "	× .2168	=	"	" wrought iron
" "	× .2223	=	"	" cast steel.
" "	× .2533	=	"	" copper.
" "	× .2385	=	"	" brass.
" "	× .2042	=	"	" zinc.
" "	× .3223	=	"	" lead.
" "	× .207	=	"	" tin.
" "	× .3854	=	"	" mercury.

SPECIFIC GRAVITY.

Cast Iron, -	average 7.21	Cast Steel, -	average 7.85
Wrought Iron,	" 7.78	Bessemer Steel,	" 7.86

The square of the diameter multiplied by .7854 equals area.
Diameter multiplied by 3.1416 or 3 1-7 equals circumference.

MISCELLANEOUS RULES AND TABLES.

TABLE OF WEIGHT OF CAST IRON BALLS.

Diameter. Inches.	Weight. Lbs.	Diameter. Inches.	Weight. Lbs.	Diameter. Inches.	Weight. Lbs.
2	1.09	5	17.04	8	69.81
2½	2.13	5½	22.68	8½	83.73
3	3.68	6	29.45	9	99.40
3½	5.84	6½	37.44	10	136.35
4	8.73	7	46.76	11	181.48
4½	12.42	7½	57.52	12	235.65

TO FIND THE WEIGHT OF CAST IRON BALLS WHEN THE DIAMETER IS GIVEN.

Rule: Multiply the cube of the diameter by .1377.

TO FIND THE DIAMETER OF CAST IRON BALLS WHEN THE WEIGHT IS GIVEN.

Rule: Multiply the cube root of the weight by 1.936.

TO FIND THE WEIGHT OF A SPHERICAL SHELL.

From the weight of a ball of the outer diameter subtract the weight of one of the inner diameters.

CAST IRON—ASSUMED WEIGHT IN ESTIMATING

A cubic foot, - - - - - = 450 lbs.
A square foot, 1 inch thick, - - - - = 38 "
A bar 1 inch square and 1 foot long, - - = 3.125 "

TABLE OF WEIGHT OF LINEAL FOOT OF ROUND CAST IRON.

Diameter. Inches.	Weight. Lbs.	Diameter. Inches.	Weight. Lbs.	Diameter. Inches.	Weight. Lbs.
1	2.45	5	61.36	9	198.80
1¼	3.84	5¼	67.65	9½	221.51
1½	5.52	5½	74.25	10	245.44
1¾	7.52	5¾	81.15	10½	270.60
2	9.82	6	88.36	11	296.98
2¼	12.43	6¼	95.87	11½	324.59
2½	15.34	6½	103.70	12	353.43
2¾	18.56	6¾	111.83	13	414.79
3	22.09	7	120.26	14	481.06
3¼	25.92	7¼	129.01	15	552.23
3½	30.07	7½	138.06	16	628.32
3¾	34.52	7¾	147.42	17	709.31
4	39.27	8	157.08	18	795.22
4¼	44.33	8¼	167.05	20	981.75
4½	49.70	8½	177.33	22	1187.92
4¾	55.38	8¾	187.91	24	1413.72

Square of diameter multiplied by 2.46 equals weight of cast iron round bar 1 foot long.

To ascertain weight of cast iron columns or pipe subtract weight of inside diameter of shell from weight of outside diameter.

Square of the diameter divided by 5 equals approximately the weight of a circular cast iron plate 1 inch thick.

IRON ROOFS AND FRAMES.

We show on another page a few cuts of trusses with the dimensions, strength, etc., given, but the variety of work of this character is so great that it is impossible to give more than a suggestion in this publication.

We therefore invite our friends to write us should they desire special roofs or trusses, upon which we will be glad to furnish plans and *estimates* for *Roofs, Trusses*, and all styles of specially constructed work of that character.

Iron, "trusses only," for roofs, with rise of one-third to one-sixth the span, will weigh approximately as follows:

For	30	-foot span,	2¾	lbs.	per square foot	of area covered.
"	40	"	3¾	"	"	"
"	50	"	4⅝	"	"	"
"	60	"	5½	"	"	"
"	70	"	6⅜	"	"	"
"	80	"	7⅜	"	"	"
"	90	"	8¼	"	"	"
"	100	"	9	"	"	"
"	120	"	10¾	"	"	"
"	140	"	12	"	"	"
"	175	"	14	"	"	"

Add for "purlins," where the trusses are seven to twelve feet apart, two to four pounds per square foot to the above weights, and you will have the approximate weight of roof framing heavy enough to carry plastered ceilings and slate laid in mortar on boards with an ample factor of safety. Many first-class economical designs of roofs now built run below the above weights.

The following are average weights of some other constructions, and the usual assumptions made for superimposed load:

Iron roof of 100 feet span, with corrugated iron laid directly upon purlins, will weigh

Approximately,	10 lbs.	₱ sq. ft.
If boarded, add	3 "	"
For lathed and plastered ceiling, allow	10 "	"
For snow and vertical component of wind force, allow	30 "	"
Weight of snow, freshly fallen,	5 to 12 "	cub. ft.
" " saturated (slush),	40 "	"
Wind pressure (violent hurricane),	50 "	sq. ft.

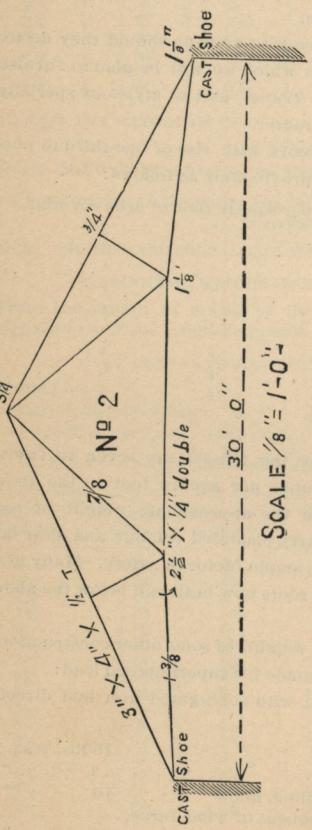
The weight of one square foot of ordinary tar, felt and gravel roof is 4 to 6 lbs. per square foot.

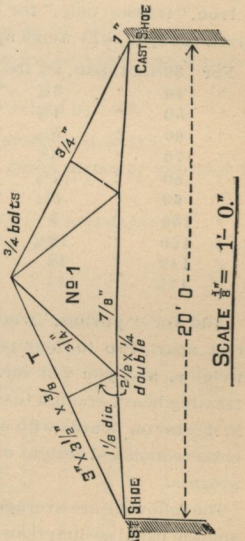
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

TRUSS No. 1.

Will carry slate covering, snow loads and wind pressure of 40 pounds per square foot when trusses are placed 8 feet apart. If placed 6′ 6″ apart the span may be increased to 24′ 0″.

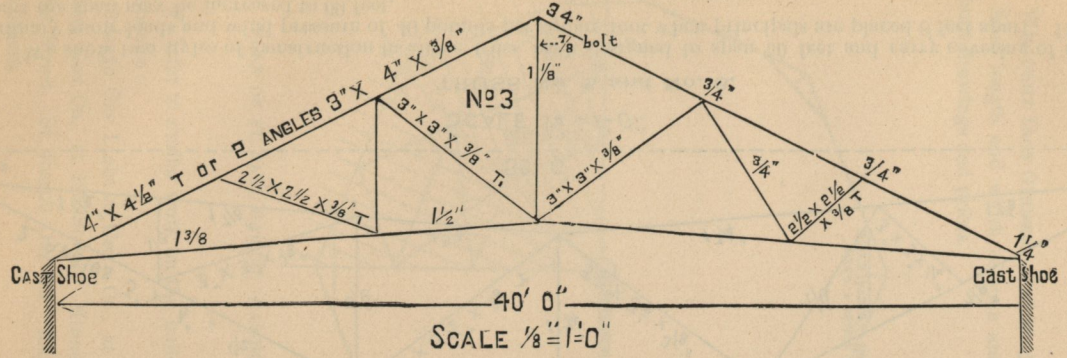




TRUSS No. 2.

Same note applies as given for truss No. 1, except that the span may be increased to 36′ 0″ if trusses are placed 6′ 6″ centers,

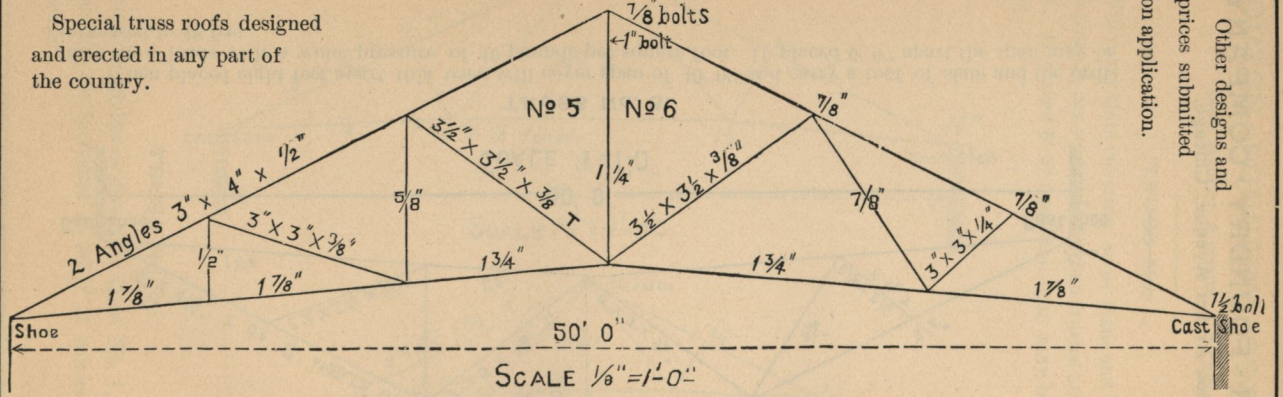
BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.



TRUSS No. 3.

When placed eight feet apart this truss will cover span of 40′ 0″ and carry a roof of slate and the ordinary snow loads with a wind pressure of 40 pounds per square foot. If placed 6′ 6″ apart the span may be increased to 48 feet.

Special truss roofs designed and erected in any part of the country.



Other designs and prices submitted on application.

TRUSS No. 5 and No. 6.

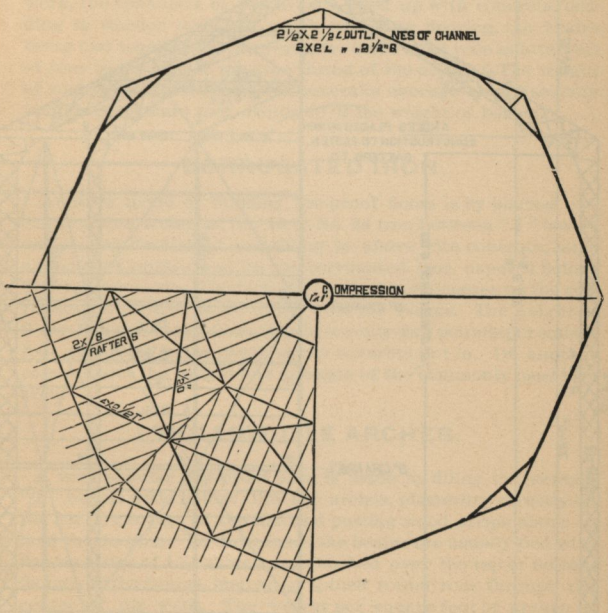
We show two styles of construction in above truss, each designed to span 50 feet and carry covering of slate with the ordinary snow loads and wind pressure of 40 pounds per square foot when principals are placed 8 feet apart. If placed 6′ 6″ apart the span may be increased to 60 feet.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

WROUGHT IRON GIRDERS of all kinds designed and built.

Send length and width of span and load, and we will submit drawings and prices.



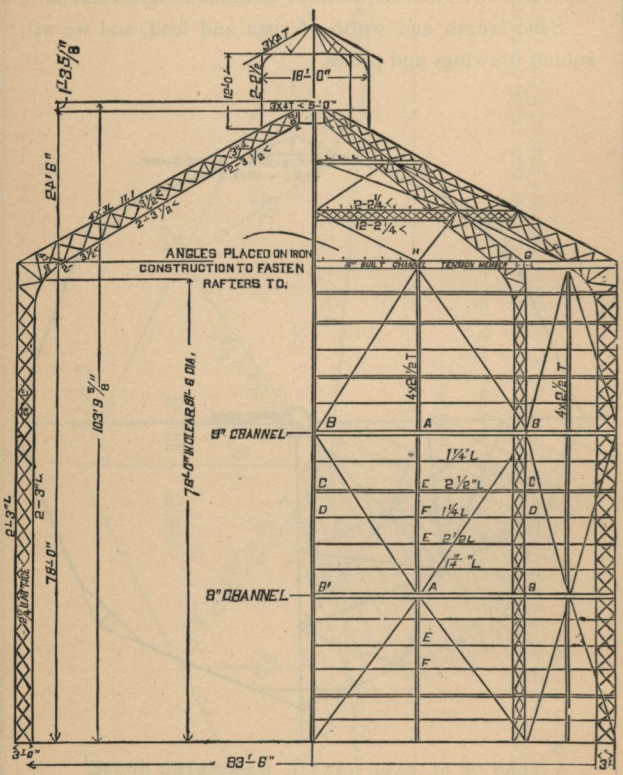
PLAN OF ST. PAUL GAS CO. GASOMETER HOUSE.

We refer to similar work on the buildings for following companies :

Chicago Gas Light & Coke Co., at 31st Street. Consumers Gas Co., at 23d Street, Minneapolis Gas Co., at Cedar Street. St. Joseph Gas Co. Kansas City Gas Co., and others.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



IRON BUILDING

erected for St. Paul Gas Co. Designed by our engineer. Covered with corrugated iron and protecting gasometer from frost, fire, etc.

Similar work designed and executed at lowest rates.

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

FIRE-PROOF FLOORS.

BRICK.

There are various fire-proof floors in use, one of the most common of which is four-inch brick arches turned between "I" beams not over five feet apart, plastered directly on the brick-work, the spandrels of the arches, filled up with concrete, bedding in wooden strips, to which to secure flooring, the beams being tied together by three-quarter inch round rods at intervals of four to six feet, to take the thrust of the arches. The weight of such floor construction will generally average about seventy pounds per square foot, exclusive of the weight of beams.

CORRUGATED IRON.

Another mode of building fire-proof floors is by placing corrugated iron arches of No. 16 to No. 24 iron between "I" beams not over six feet apart, and filling in above with concrete, same as for brick arches, leaving the corrugated iron exposed below. This is open to the objection that moisture condenses on the corrugated iron and drops down into the rooms. The weight of floors like this varies from fifty to seventy-five pounds per square foot, according to the depth of the concrete put in. On another page we give the weight and strength of the commonly used iron arch.

HOLLOW TILE ARCHES.

A very popular fire-proof floor is made by filling in between "I" beams with hollow tile flat arches, plastering directly on the flat, lower part of the tile, and putting wood strips above to hold the flooring. In these cases the beams are usually tied with flat hook ties of 1½x⅜ inch iron hooked over the top or bottom flanges of the beams, instead of ¾-inch round rods through the center of the webs. The weight per square foot of arches of this kind, without plastering the flooring, is for

15-inch heavy arches for warehouses	50 lbs.
12-inch heavy arches for warehouses	36 "
9-inch arches for general use	32 "
6-inch light arches	22 "
3¾-inch flat roof tiling, laid between tee irons, not arched	12 "

For superimposed load on floors of dwellings assume 60 lbs. per square foot.

For superimposed load on floors of churches, theatres and ball rooms, assume 125 lbs. per square foot.

For superimposed load on floors of warehouses, 250 lbs. per square foot.

Crowd of people, closely packed, 80 lbs. per square foot.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

CEILINGS.

Ceilings are made by large tee iron main supports three to six feet apart, and light cross tees twelve inches apart, filled in with thin tiling set in between the tee irons, plastering directly on the tiling. The weight of this construction, without plastering, is about five pounds per square foot.

ROOF COVERING

Is of great variety, but the most approved style now in use is the iron eye beam purlin, with *hollow tile arches*, as described on page for floors, covered with concrete, on which is laid the ordinary felt and gravel.

Steep roofs are sometimes covered with porous tiling set in tee iron, to which slates are nailed, same as to boards. The weight per square foot of this kind of work is about ten pounds without the slate.

Slate is also secured directly to tee or angle iron purlins with wires; weight about fifteen pounds per square foot.

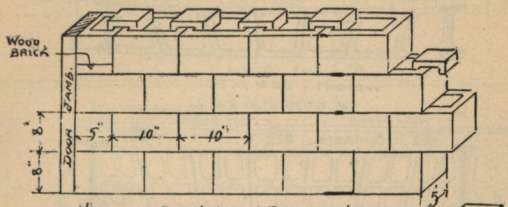
FANCY TILES.

The Terra Cotta companies furnish fancy shaped and colored roof tiles, to be bedded in mortar and secured in place with wires on tee iron purlins, which, for purlins eight inches apart, vary from twenty-five to thirty-five pounds per square foot. Most of their patterns weigh thirty pounds, including the mortar.

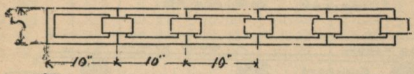
The BOUTON FOUNDRY CO. have special facilities for doing Truss and Roof Work in the most appoved manner, and will furnish plans and specifications, if desired, for TRUSSES, CEILINGS, FLOORS, and any other Special Work in their line.

BOUTON · FOUNDRY · COMPANY,

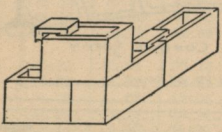
2600 Archer Avenue, Chicago.



VIEW OF 5IN. HOLLOW PARTITION WALL.
WEIGHT 25 LBS PER SQ. FT.

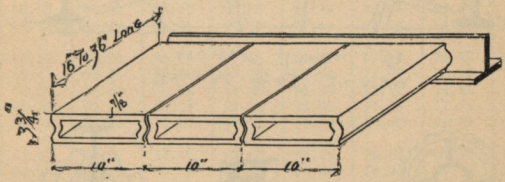


PLAN OF SAME SHOWING HOW TILES ARE CLAMPED TOGETHER.

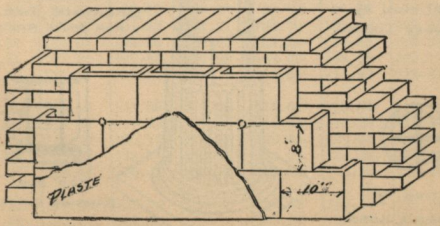


VIEW OF CORNER FORMED OF 5IN. HOLLOW PARTITION TILE.

SKEWBACK TILE FOR 4IN BRICK ARCH.



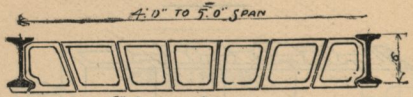
FLAT ROOF TILE BETWEEN T IRONS.
WEIGHT 16 LBS. PER SQ. FT.



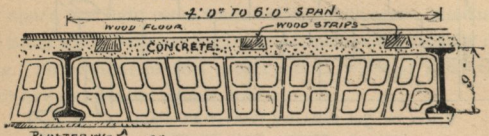
VIEW OF HOLLOW TILE FURRING FOR OUTSIDE WALLS VAULT LININGS &c. WEIGHT 8 LBS. PER FT.
SPECIAL SIZES MADE TO ORDER.

BOUTON · FOUNDRY · COMPANY,

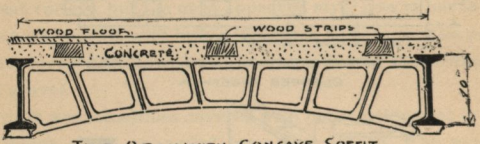
2600 Archer Avenue, Chicago.



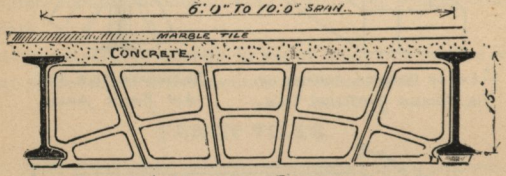
6" Light Arch.
Weight = 22 lbs pr. Ft.



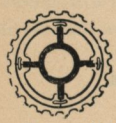
9" Web Tile Arch
Weight 38 lbs per Ft.



Tile Arch with Concave Soffit



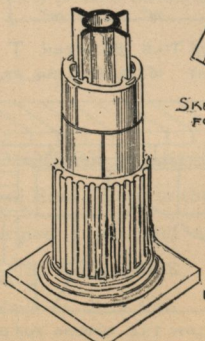
15" Heavy Arch
Weight 50 lbs per Ft.



Section of Flanged Column.

Skewback Tile for Brick Arch

Section of Flanged Column showing Break Joint.



View of Flanged Column encased with 1¾ in. Solid Mill

Tile for Encasing Girders

We are under obligations to the Pioneer Fire-Proof Construction Co. for cuts of fire-proofing.

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

CIRCUMFERENCES OF CIRCLES.

Advancing by Eighths.

CIRCUMFERENCES.

Diam.	.0	.⅛	.¼	.⅜	.½	.⅝	.¾	.⅞
0	.0	.3927	.7854	1.178	1.570	1.963	2.356	2.748
1	3.141	3.534	3.927	4.319	4.712	5.105	5.497	5.890
2	6.283	6.675	7.068	7.461	7.854	8.246	8.639	9.032
3	9.424	9.817	10.21	10.60	10.99	11.38	11.78	12.17
4	12.56	12.95	13.35	13.74	14.13	14.52	14.92	15.31
5	15.70	16.10	16.49	16.88	17.27	17.67	18.06	18.45
6	18.84	19.24	19.63	20.02	20.42	20.81	21.20	21.59
7	21.99	22.38	22.77	23.16	23.56	23.95	24.34	24.74
8	25.13	25.52	25.91	26.31	26.70	27.09	27.48	27.88
9	28.27	28.66	29.05	29.45	29.84	30.23	30.63	31.02
10	31.41	31.80	32.20	32.59	32.98	33.37	33.77	34.16
11	34.55	34.95	35.34	35.73	36.12	36.52	36.91	37.30
12	37.69	38.09	38.48	38.87	39.27	39.66	40.05	40.44
13	40.84	41.23	41.62	42.01	42.41	42.80	43.19	43.58
14	43.98	44.37	44.76	45.16	45.55	45.94	46.33	46.73
15	47.12	47.51	47.90	48.30	48.69	49.08	49.48	49.87
16	50.26	50.65	51.05	51.44	51.83	52.22	52.62	53.01
17	53.40	53.79	54.19	54.58	54.97	55.37	55.76	56.15
18	56.54	56.94	57.33	57.72	58.11	58.51	58.90	59.29
19	59.69	60.08	60.47	60.86	61.26	61.65	62.04	62.43
20	62.83	63.22	63.61	64.01	64.40	64.79	65.18	65.58
21	65.97	66.36	66.75	67.15	67.54	67.93	68.32	68.72
22	69.11	69.50	69.90	70.29	70.68	71.07	71.47	71.86
23	72.25	72.64	73.04	73.43	73.82	74.22	74.61	75.00
24	75.39	75.79	76.18	76.57	76.96	77.36	77.75	78.14
25	78.54	78.93	79.32	79.71	80.10	80.50	80.89	81.28
26	81.68	82.07	82.46	82.85	83.25	83.64	84.03	84.43
27	84.82	85.21	85.60	86.00	86.39	86.78	87.17	87.57
28	87.96	88.35	88.75	89.14	89.53	89.92	90.32	90.71
29	91.10	91.49	91.89	92.28	92.67	93.06	93.46	93.85
30	94.24	94.64	95.03	95.42	95.81	96.21	96.60	96.99
31	97.39	97.78	98.17	98.57	98.96	99.35	99.75	100.14
32	100.53	100.92	101.32	101.71	102.10	102.49	102.89	103.29
33	103.67	104.07	104.46	104.85	105.24	105.64	106.03	106.42
34	106.81	107.21	107.60	107.99	108.39	108.78	109.17	109.56
35	109.96	110.35	110.74	111.13	111.53	111.92	112.31	112.71
36	113.10	113.49	113.88	114.28	114.67	115.06	115.45	115.85
37	116.24	116.63	117.02	117.42	117.81	118.20	118.61	118.99
38	119.38	119.77	120.17	120.56	120.95	121.34	121.74	122.13
39	122.52	122.92	123.31	123.70	124.09	124.49	124.88	125.27
40	125.66	126.06	126.45	126.84	127.24	127.63	128.02	128.41
41	128.81	129.20	127.59	129.98	130.38	130.77	131.16	131.55
42	131.95	132.34	132.73	133.13	133.52	133.91	134.30	134.70
43	135.09	135.48	135.87	136.27	136.66	137.05	137.45	137.84
44	138.23	138.62	139.02	139.41	139.80	140.19	140.59	140.98
45	141.37	141.76	142.16	142.55	142.94	143.34	143.73	144.12

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

AREAS OF CIRCLES.

Advancing by Eighths.

AREAS.

Diam.	.0	.⅛	.¼	.⅜	.½	.⅝	.¾	.⅞
0	.0	.0122	.0490	.1104	.1963	.3068	.4417	.6013
1	.7854	.9940	1.227	1.484	1.767	2.073	2.405	2.761
2	3.1416	3.546	3.976	4.430	4.908	5.411	5.939	6.491
3	7.068	7.669	8.295	8.946	9.621	10.32	11.04	11.79
4	12.56	13.36	14.18	15.03	15.90	16.80	17.72	18.66
5	19.63	20.62	21.64	22.69	23.75	24.85	25.96	27.10
6	28.27	29.46	30.67	31.91	33.18	34.47	35.78	37.12
7	38.48	39.87	41.28	42.71	44.17	45.66	47.17	48.70
8	50.26	51.84	53.45	55.08	56.74	58.42	60.13	61.86
9	63.61	65.39	67.20	69.02	70.88	72.75	74.66	76 58
10	78.54	80.51	82.51	84.54	86.59	88.66	90.76	92.88
11	95.03	97.20	99.40	101.6	103.8	106.1	108.4	110.7
12	113.0	115.4	117.8	120.2	122.7	125.1	127.6	130.1
13	132.7	135.2	137.8	140.5	143.1	145.8	148.4	151.2
14	153.9	156.6	159.4	162.2	165.1	167.9	170.8	173.7
15	176.7	179.6	182.6	185.6	188.6	191.7	194.8	197.9
16	201.0	204.2	207.3	210.5	213.8	217.0	220.3	223.6
17	226.9	230.3	233.7	237.1	240.5	243.9	247.4	250.9
18	254.4	258.0	261.5	265.1	268.8	272.4	276.1	279.8
19	283.5	287.2	291.0	294.8	298.6	302.4	306.3	310.2
20	314.1	318.1	322.0	326.0	330.0	334.1	338.1	342.2
21	346.3	350.4	354.6	358.8	363.0	367.2	371.5	375.8
22	380.1	384.4	388.8	393.2	397.6	402.0	406.4	410.9
23	415.4	420.0	424.5	429.1	433.7	438.3	443.0	447.6
24	452.3	457.1	461.8	466.6	471.4	476.2	481.1	485.9
25	490.8	495.7	500.7	505.7	510.7	515.7	520.7	525.8
26	530.9	536.0	541.1	546.3	551.5	556.7	562.0	567.2
27	572.5	577.8	583.2	588.5	593.9	599.3	604.8	610.2
28	615.7	621.2	626.7	632.3	637.9	643.5	649.1	654.8
29	660.5	666.2	671.9	677.7	683.4	689.2	695.1	700.9
30	706.8	712.7	718.6	724.6	730.6	736.6	742.6	748.6
31	754.8	760.9	767.0	773.1	779.3	785.5	791.7	798.0
32	804.3	810.6	816.9	823.2	829.6	836.0	842.4	848.8
33	855.3	861.8	868.3	874.9	881.4	888.0	894.6	901.3
34	907.9	914.7	921.3	928.1	934.8	941.6	948.4	955.3
35	962.1	969.0	975.9	982.8	989.8	996.8	1003.8	1010.8
36	1017.9	1025.0	1032.1	1039.2	1046.3	1053.5	1060.7	1068.0
37	1075.2	1082.5	1089.8	1097.1	1104.5	1111.8	1119.2	1126.7
38	1134.1	1141.6	1149.1	1156.6	1164.2	1171.7	1179.3	1186.9
39	1194.6	1202.3	1210.0	1217.7	1225.4	1233.2	1241.0	1248.8
40	1256.6	1264.5	1272.4	1280.3	1288.2	1296.2	1304.2	1312.2
41	1320.3	1328.3	1336.4	1344.5	1352.7	1360.8	1369.0	1377.2
42	1385.4	1393.7	1402.0	1410.3	1418.6	1427.0	1435.4	1443.8
43	1452.2	1460.7	1469.1	1477.6	1486.2	1494.7	1503.3	1511.9
44	1520.5	1529.2	1537.9	1546.6	1555.3	1564.0	1572.8	1581.6
45	1590.4	1599.3	1608.2	1617.0	1626.0	1634.9	1643.9	1652.9

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

SURVEYING MEASURE.

(LINEAL.)

Inches.		Feet.		Yards.		Chains.		Mile.
1.	=	.0833	=	.0278	=	.00126	=	.0000158
12.		1.		.333		.01515		.000189
36.		3.		1.		.04545		.000568
792.		66.		22.		1.		.0125
63360.		5280.		1760.		80.		1.

One knot or geographical mile = 6086.07 feet = 1855.11 metres = 1.1526 statute mile.

One admiralty knot = 1.1515 statute miles = 6080 feet.

LONG MEASURE.

Inches.		Feet.	Yards.	Poles.	Furl.	Mile.
1.	=	.083	= .02778	= .005	= .000126	= .0000158
12.		1.	.333	.0606	.00151	.0001894
36.		3.	1.	.182	.00454	.000568
198.		16½.	5½.	1.	.025	.003125
7920.		660.	220.	40.	1.	.125
63360.		5280.	1760.	320.	8.	1.

A palm = 3 inches. A hand = 4 inches.

A span = 9 inches. A cable's length = 120 fathoms.

FRENCH LONG MEASURE.

	Inches.	Feet.	Yards.	Miles.
Millimetre	.03937	.0033		
Centimetre	.39368	.0328		
Decimetre	3.9368	.3280	.10936	
Metre	39.368	3.2807	1.09357	
Decametre	393.68	32.807	10.9357	
Hectometre		328.07	109 357	.062134
Kilometre		3280.7	1093 57	621346
Myriametre		32807.	10935.7	6.213466

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

SQUARE MEASURE.

Inches.		Feet.	Yard	Perches.	Acre.
1.	=	.00694	= .000772	= .0000255	= .000000159
144.		1.	.111	.00367	.000023
1296.		9.	1.	.0331	.0002066
39204.		272¼.	30¼.	1.	.00625
6272640.		43560.	4840.	160.	1.

100 square feet = 1 square.
10 square chains = 1 acre.
1 chain wide = 8 acres per mile.
1 hectare = 2.471143 acres.
1 square mile = 27,878,400 square feet. = 3,097,600 square yards. = 640 acres.

Acres × .0015625 = square mile.
Square yard × .000000323 = square miles.
Acres × 4840 = square yards.
Square yards × 0002066 = acres.

A section of land is 1 mile square, and contains 640 acres.
A square acre is 208.71 ft. at each side; or, 1 20 × 198 ft.
A square ½ acre is 147.58 ft. at each side; or, 110 × 198 ft.
A square ¼ acre is 104.355 ft. at each side; or, 55 × 198 ft.
A circular acre is 235 504 ft. in diameter.
A circular ½ acre is 166.527 ft. in diameter.
A circular ¼ acre is 117.752 ft. in diameter.

FRENCH SQUARE MEASURE.

Square.	Square Inches.	Square Feet.	Square Yards.
Millimetre.	.00154	.0000107	.000001
Centimetre	.15498	.0010763	.000119
Decimetre.	15.498	.1076305	.011958
Met. or Cen	1549.8	10.76305	1 19589
Decametre.	154988.	1076.305	119.589
Hectare ...	.....	107630.58	11958.95
Kilometre.	.38607 □ mls	10763058.	1195895.
Myriamet.	38.607 "	.....	.....

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

CUBIC MEASURE.

Inches.		Feet.		Yard.		Cubic Metres.
1.	=	.0005788	=	.000002144	=	.000016386
1728.		1.		.03704		.028315
46656.		27.		1.		.764513

A CUBIC FOOT IS EQUAL TO

1728 cubic inches.
.037037 cubic yard.
.803564 U. S struck bushel of 2150.42 cub. in.
3.21426 U. S. pecks.
7.48052 U. S. liquid gallons of 231 cub. in.
6.42851 U. S dry gallons of 268.8025 cub. in.
29.92208 U. S. liquid quarts.
25.71405 U. S. dry quarts.
59.84416 U. S. liquid pints.
51.42809 U. S. dry pints.
239.37662 U. S. gills.
.26667 flour barrel of 3 struck bushels.
.23748 U. S. liquid barrel of 31½ gallons.

A cubic inch of water at 62° Fahr. weighs 252.458 grains.
A cubic foot of water at 62° Fahr. weighs 1002.7 ounces.
A cubic yard of water at 62° Fahr. weighs 1692. pounds.

FRECNH CUBIC OR SOLID MEASURE.

		Pint.	Quart.	Bush.	Cubic Inch.	Cu. Ft
Centilitre	Dry	.0181	------	------	.61016	
	Liquid	.0211	------	------		
Decilitre	Dry	.1816	.0908	------	6.1016	
	Liquid	.2113	.1056	------		
Litre	Dry	1.816	.908	------	61.016	.0353
	Liquid	2.113	1.056	------		
Decalitre	Dry	----	9.08	.2837	610.16	.3531
	Liquid	21.13	10 56	------		
Hectolitre	Dry	----	90.8	2.837	6101.6	3.531
	Liquid	211.3	105.6	------		
Kilolitre or Cubic Metre	Dry	----	------	28.37	61016.	35.31
	Liquid	----	1056.5	------		
Myriolitre	Dry	----	-----	283.7	------	353.1
	Liquid	----	10565.	------		

BOUTON · FOUNDRY · COMPANY,
2600 Archer Avenue, Chicago.

AVOIRDUPOIS WEIGHT.

The standard avoirdupois pound is the weight of 27.7015 cubic inches of distilled water, weighed in the air, at 39.83 degrees Fahr., barometer at thirty inches.

Ounces.		Pounds.	Quarters.	Cwts.	Ton.
1.	=	.0625 =	.00223 =	.000558 =	.000028
16.		1.	.0357	.00893	.000447
448.		28.	1.	.25	.0125
1792.		112.	4.	1.	.05
35840.		2240.	80.	20.	1.

A drachm = 27.343 grains.
A stone = 14 pounds.
A quintal = 100 kilogrammes.

7000 grains = 1 avoir. pound = 1.21528 troy pounds.
5760 grains = 1 troy pound = .82285 avoir. pound.

Kilos p. sq. centim. × 14.22 = Pounds p. sq. inch.
Pounds p. sq. inch × .0703 = Kilos p. sq. centim.

FRENCH WEIGHTS.

EQUIVALENT TO AVOIRDUPOIS.

	Grains.	Ounces.	Pounds.
Milligramme	.015433		
Centigramme	.154331	.000352	.000022
Decigramme	1.54331	.003527	.000220
Gramme	15.4331	.035275	.002204
Decagramme	154.331	352758	.022047
Hectogramme	1543.31	3.52758	.220473
Kilogramme	15433.1	35.2758	2.20473
Myriogramme	----------	352.758	22.0473
Quintal	----------	3527 58	220.473
Millier or Tonne	----------	35275.8	2204.73

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

Crushing and Tensile Strength, in lbs., per sq. inch of Natural and Artificial Stones.

DESCRIPTION.	Weight per Cubic ft in lbs	Crushing Force. Lbs. per Square inch.
Aberdeen Blue Granite	164	8,400 to 10,914
Quincy Granite	166	15,300
Freestone, Belleville		3,522
Freestone, Caen		1,088
Freestone, Connecticut		3,319
Sandstone, Acquia Creek, used for Capitol Washington		5,340
Limestone, Magnesian, Grafton, Ill		17,000
Marble, Hastings, N. Y		18,941
Marble, Italian		12,624
Marble, Stockbridge, City Hall, N. Y		10,382
Marble, Statuary		3,216
Marble, Veined	165	9,681
Slate		9,300
Brick, Red	135.5	808
Brick, Pale Red	130.3	562
Brick, Common		800 to 4,000
Brick, Machine Pressed		6,222 to 14,216
Brick, Stock		2,177
Brick-work, set in Cement, bricks not very hard,		521
Brick, Masonry, Common		500 to 800
Cement, Portland		1,000 to 8,300
Cement, Portland, Cement 1, Sand 1		1,280
Cement, Roman		342
Mortar		120 to 240
Crown Glass		31,000
		TENSION.
Portland Cement		427 to 711
Portland Cement, with Sand		92 to 284
Glass, Plate		9,420
Mortar		50
Plaster of Paris		72
Slate		11,000

Capacity of Cylindrical Cisterns.

FOR EACH FOOT OF DEPTH.

Diameter in Feet.	Gallons.	Pounds.	Diameter in feet.	Gallons.	Pounds.
2.0	23.5	196	9.0	475.9	3,968
2.5	36.7	306	9.5	530.2	4,421
3.0	52.9	441	10.0	587.5	4,899
3.5	72.0	600	11.0	710.9	5,928
4.0	94.0	784	12.0	846.0	7,054
4.5	119.0	992	13.0	992.9	8,280
5.0	146.9	1,225	14.0	1,151.5	9,602
5.5	177.7	1,482	15.0	1,321.9	11,023
6.0	211.5	1,764	20.0	2,350.1	19,596
6.5	248.2	2,070	25.0	3,672.0	30,620
7.0	287.9	2,401	30.0	5,287.7	44,093
7.5	330.5	2,756	35.0	7,197.1	60,016
8.0	376.0	3,135	40.0	9,400.3	78,383
8.5	424.5	3,540	----	------	------

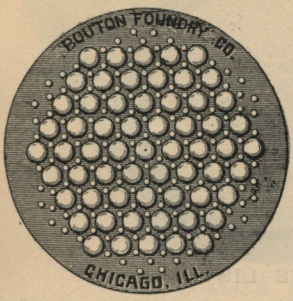
PROPERTIES OF TIMBER.

DESCRIPTION.	Weight per Cubic Foot in lbs.	Weight per foot B. M. in lbs., average	Tensile strength per sq. in., in lbs.	Crushing strength per sq. in., in lbs.	Relative strength for cross breaking. White Pine = 100.	Shearing strength with the grain, lbs. per sq. in.	Pressure in lbs. per sq. in. to indent 1-20"
Ash	43 to 55.8	4.1	11,000 to 17,207	4,400 to 9,363	120 to 180	458 to 700	1,800 to 1,850
Beech	43 to 53.4	3.9	11,500 to 18,000	5,800 to 9,363	100 to 104		
Cedar	50 to 56.8	4.5	10,300 to 11,400	5,600 to 6,000	55 to 63		
Cherry					130		
Chestnut	33	2.75	10,500	5,350 to 5,600	96 to 123		
Elm	34 to 36.7	2.9	13,400 to 13,489	6,831 to 10,331	96		
Hemlock			8,700	5,700	88 to 95		
Hickory			12,800 to 18,000	8,925	150 to 210		
Locust	44	3.7	20,500 to 24,800	9,113 to 11,700	132 to 227		
Maple	49	4.1	10,500 to 10,584	8,150	122 to 220	367 to 647	1,700 to 1,900
Oak, White	45 to 54.5	4.1	10,253 to 19,500	4,684 to 9,509	130 to 177	752 to 966	2,300 to 3,550
Oak, Live	70	5.8		6,850	155 to 189		
Pine, White	30	2.5	10,000 to 12,000	5,000 to 6,650	100	225 to 423	875 to 1,160
Pine, Yellow	28.8 to 33	2.6	12,600 to 19,200	5,400 to 9,500	98 to 170	286 to 415	1,900
Spruce			10,000 to 19,500	5,050 to 7,850	86 to 110	253 to 374	875 to 1,025
Walnut, Black	42	3.5	9,286 to 16,000	7,500			2,200 to 2,600

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

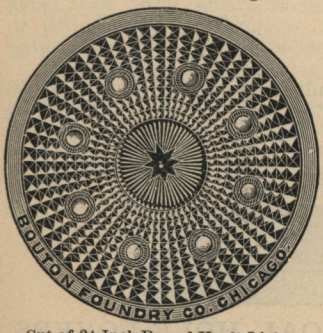
COAL HOLE LIGHTS.



Cut of 20 inch Coal Hole Light.

PRICE LIST.

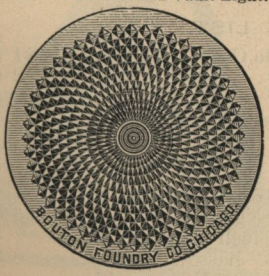
16 in. diam., round, 30 glasses	$3.50
18 in. diam., round, 36 glasses	5.00
21 in. diam., round, 54 glasses	6.50
23 in. diam., round, 60 glasses	8.00



Cut of 24 Inch Round Vault Light.

PRICE LIST.

16 inch diameter, 6 glasses	$2.50
18 inch diameter, 9 glasses	3.00
20 inch diameter, 12 glasses	3.50
24 inch diameter, 12 glasses	5.00



Cut of 18 inch Solid Cover.

PRICE LIST.

16 inch diameter	$1.50
18 " "	2.00
20 " "	2.50
24 " "	4.00

Above covers kept in stock.

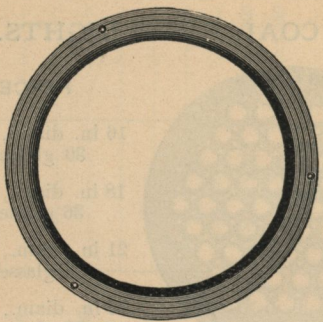
For Rings for above covers, see next page.

Thimbles for round Vault Lights made to order.

Fastening Bar and Thumb Screw extra 50 cents.

BOUTON · FOUNDRY · COMPANY,

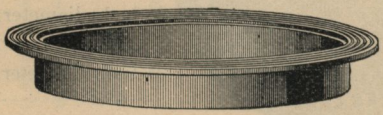
2600 Archer Avenue, Chicago.



PRICE LIST.

Ring for 16 inch Coal Hole Cover	$1 00
" " 18 " " " "	1 25
" " 20 " " " "	1 50
" " 24 " " " "	2 50
Ring for 16 inch round Vault Light	$1 50
" " 18 " " " "	2 00
" " 21 " " " "	2 50
" " 23 " " " "	3 00

Above rings kept in stock.

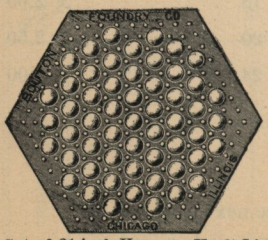


THIMBLE FOR COAL HOLE COVERS.

PRICE LIST.

Thimble for 16 inch Coal Hole Cover	$1 50
" " 18 " " " "	2 00
" " 20 " " " "	2 50

Above Thimbles are 4 inches deep.



Cut of 21 inch Hexagon Vault Light.

PRICE LIST.

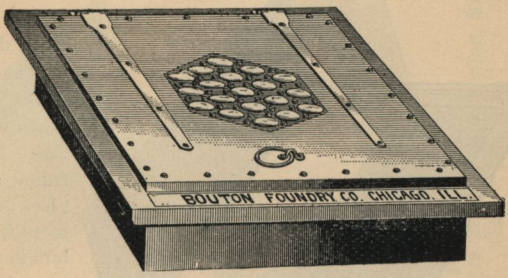
18 inch Hexagon, 43 glasses	$ 5 00
21 inch Hexagon, 53 glasses	8 00
25 inch Hexagon, 91 glasses	11 00
29 inch Hexagon, 133 glasses	15 00

Thimbles or Rings for Hexagon Covers made to order.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

WROUGHT IRON COAL HOLE COVER



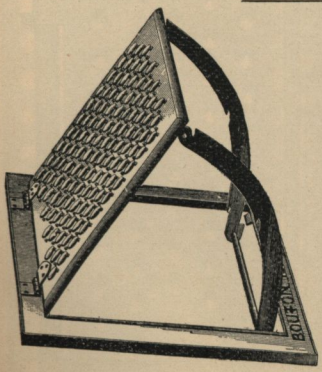
PRICE LIST.

Small Door, 26 in. square, 20 inch square opening, 19 glasses $16 00

Large Door, 30 in. square, 24 inch square opening, 19 glasses 20 00

These doors are made very strong, for rough usage; have a very heavy cast iron frame, with thimble 7 inches deep, and wrought iron door made from ¼ inch boiler iron, well supported with angle iron. They are well adapted for taking in steam coal or small freight, are water tight when closed and lock with a bolt on under side.

Above sizes kept in stock. Other sizes made to order.



PRICE LIST.

Small Ventilating Door, 22 in. square, 16 in. square open'g, 37 glasses. $12 00

Medium Ventilating Door, 26 in. square, 20 in. sq. open'g, 63 glasses, 16 00

Large Ventilating Door, 30 in. square, 24 in. square open'g, 103 glasses, 20 00

These doors are self-locking and water tight when closed, and protect the hole when open.

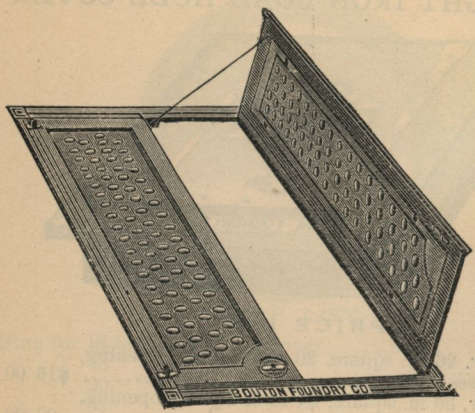
Above sizes kept in stock.

These cuts represent Trap Doors for use over basement stairs, slides, sidewalk elevators, etc.

Are water tight when closed, and fitted with strong brass hinges and hooks to hold them open, and bolt to fasten them when closed.

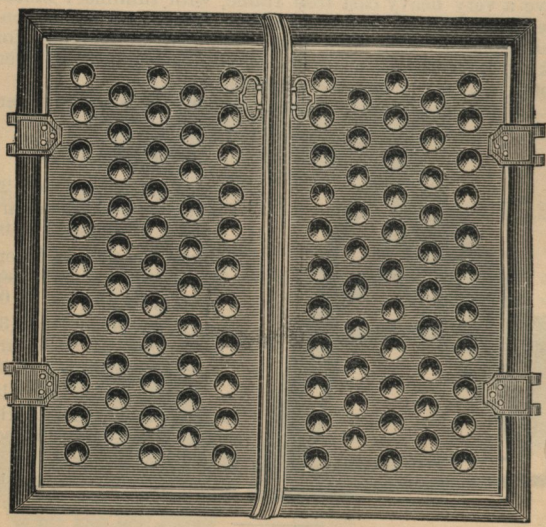
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



Trap door for side-walks, etc. Made with Cast-Iron frame, and the cement band bull's eyes; brass hinges and fastenings.

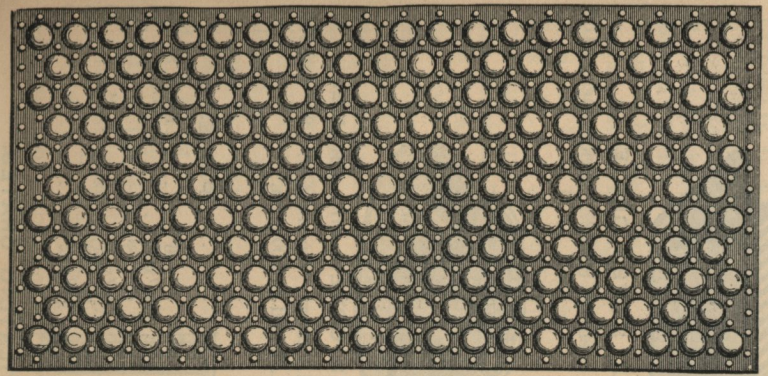
Are water-tight when closed.



STEEL-PLATE ILLUMINATED DOORS.

Fitted with brass hinges and fastenings; very light and durable.

Prices for above on application. Give size of opening.

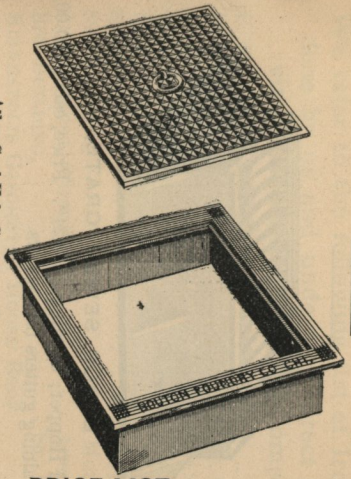


PRISMATIC LIGHT TILE.

Can be made any size or shape to suit.

Price according to construction.

Send drawings for estimates.



Alley Coal Hole Cover and Frame.

PRICE LIST.

No. 1. 26 in. square, 20 in. square opening, $15.00
No. 2. 30 " " 24 " " " 20.00

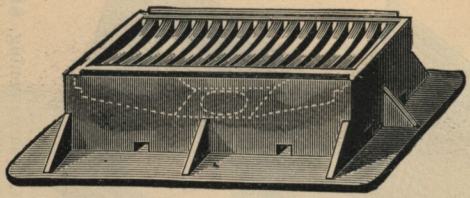
These Covers are very strong and can be driven over with heavy loads.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

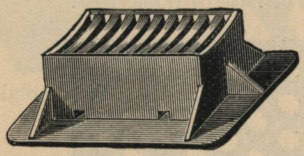
BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.



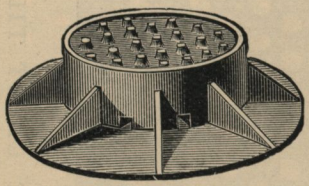
LARGE SEWER GRATE,

Frame and Hopper; opening, 12″x24″. Price, each, $10.00.
For draining gutters into sewers.



SMALL SEWER GRATE.

Frame and Hopper; opening, 8″x12″. Price, each, $4.00.



MAN-HOLE COVER and FRAME.

Chicago Standard Pattern. Opening, 18″, 20″ and 24″.
Price, $10.00, $11.00 and $12.00 each.

	PRICE.	
4″x 6″	Each, $	.15
6″x 6″	"	.20
6″x 8″	"	.25
9″x 9″	"	.30
9″x12″	"	.35
12″x12″	"	.40

VENTILATING GRATES.

BOUTON · FOUNDRY · COMPANY,

2600 Archer Avenue, Chicago.

We refer to the following list of Iron Work done by us and under the direct supervision of the officers of our Company.

U. S. Custom House, - - - - - - Chicago
U. S. Custom House, - - - - St. Louis, Mo.
U. S. Custom House, - - - - Hannibal, Mo.
U. S. Custom House, - - - New Albany, Ind.
U. S. Custom House, - - - - Des Moines, Iowa
State House, - - - - - Springfield, Ills.
State House, - - - - - - Des Moines, Iowa
State House, (First Floor) - - - Austin, Texas
Roe Building, - - - - - - St. Louis, Mo.
Minneapolis Gasometer House Roof.
St. Paul Gasometer House (Iron).
Chicago G. L. & C. Co. Gasometer House Roof.
Consumers Generator House Roof, - - Chicago
Edison Electric Light Building, - - Chicago
Palmer House, - - - - - - - - Chicago
Sherman House, - - - - - - - Chicago
Tremont House, - - - - - - - Chicago
Grand Pacific Hotel, - - - - - Chicago
Marshall Field & Co's Stores, - - - Chicago
M. S. and L. S. R. R. Depot, - - - Chicago
P., Ft. W. & C. (Union) Depot, - - - Chicago
Pullman Building, - - - - - - Chicago
Old Board of Trade Building, - - - Chicago
New Board of Trade Building, - - Chicago
Old First National Bank Building, - - Chicago
New First National Bank Building, - Chicago
Union National Bank Building, - - - Chicago
Royal Insurance Building, - - - Chicago
Gaff Building, - - - - - - Chicago
Maller Building, - - - - - - Chicago
Nixon Building, - - - - - - - Chicago
Honore Building, - - - - - Chicago
Hitchcock Building, - - - - Chicago
Tribune Building, - - - - - - Chicago
Major Block, - - - - - - - - Chicago
Portland Block, - - - - - - - Chicago
Hooley's Theatre, - - - - - - - Chicago

And at least Seven-Eighths of the Principal Buildings in Chicago.

Send us word and we will call and estimate in any part of the United States.

Bouton Foundry Co.

FOUNDERS AND MACHINISTS,

SUCCESSORS TO

UNION FOUNDRY WORKS,

ESTABLISHED 1852.

MANUFACTURERS OF IRON WORKS
OF ALL KINDS FOR

CABLE ROAD TRACK

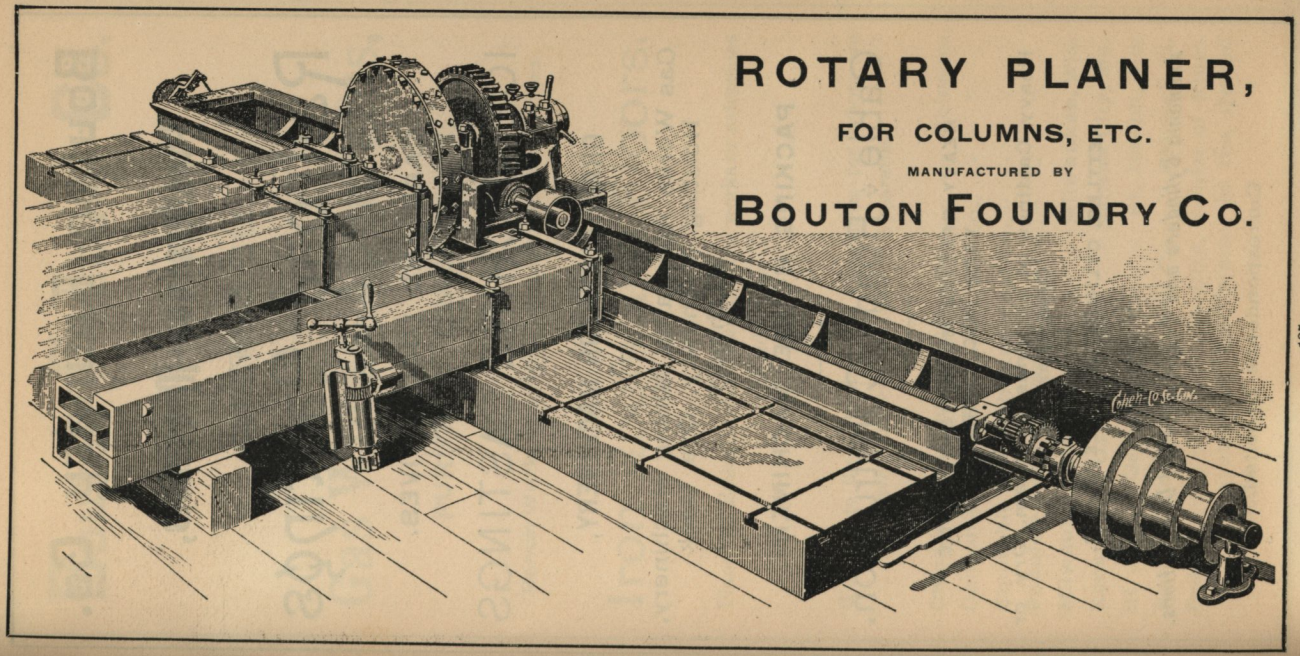
CONSTRUCTION.

YOKES OF ANY DESCRIPTION.

Carrying Sheave Pulleys and Frames, Large Sheave Wheels, Gears, Pulleys, Tension Carriages, Switch Tongues, Castings of all kinds, Architectural Iron Work, Beams, Channels, Tees, Angles, Etc.

2600 ARCHER AVENUE,

CHICAGO, ILL.


ROTARY PLANER,
FOR COLUMNS, ETC.
MANUFACTURED BY
BOUTON FOUNDRY CO.

Bouton Foundry Co.

Founders and Machinists,

WE MANUFACTURE

Railroad Castings

— FOR —

CARS AND LOCOMOTIVES.

ICE MACHINE CASTINGS

GRAIN ELEVATOR MACHINERY,

Gas Works Apparatus, Mining Machinery, Hoisting Machinery, Ore Dock Machinery,

PACKING HOUSE MACHINERY.

Cable ÷ Road ÷ Construction.

HEAVY SPECIAL MACHINERY, STONE YARD MACHINERY.

Heavy Castings of all kinds, in Loam, Dry or Green Sand.

KETTLES, CYLINDERS, PULLEYS, ETC.

Ammonia Cylinders and Castings of all Descriptions.

Correspondence Solicited.

Bouton Foundry Co.

FOUNDERS AND MACHINISTS,

CHICAGO, ILL.

Gas Works Apparatus,

PURIFIERS, CONDENSERS.

Bench Work, Specials, Lamp Posts, Scrubbers.

Iron Roofs and Floors.

Plans and Estimates furnished for new works or extensions of old works.

We refer to the following Gas Companies for whom we have made various kinds of Apparatus.

Chicago Gas Light and Coke Co., - - Chicago.
Consumers Gas Fuel and Light Co., - "
Equitable Gas Light and Fuel Co., - - "
People's Gas Light and Coke Co., - - "
Milwaukee Gas Light Co., - - Milwaukee, Wis.
Kansas City Gas Light Co., - - Kansas City, Mo.
St. Joseph Gas and Mfg. Co., - St. Joseph, Mo.
National Gas Light and Fuel Co., - Chicago, Ill.
Fred Bredel, of New York City, builder of Kloemie system of Gas Works in the United States.

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